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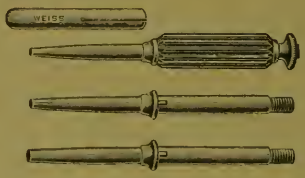

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ORIGINAL COMMUNICATIONS.

VISUAL SENSATION, PERCEPTION, APPRECIATION, AND JUDGMENT.*

BY

ROBERT W. DOYNE, M.A., F.R.C.S.,

MARGARET OGILVIE READER IN OPHTHALMOLOGY IN THE UNIVERSITY OF OXFORD.

THE subject of this lecture is a vast one, concerning, as it does, the main part of the physiology and psychology of vision. I cannot hope to deal with it fully, and shall not attempt to do more than give a sketch which, with the knowledge you may possess or with the investigations you may pursue, you will be able to fill in with greater detail.

I shall be satisfied if I can bring before your minds briefly and more or less clearly the brain machinery that produces what we call sight, and the irregular conditions arising from diseases or congenital peculiarities that come under the heading of mind blindness, including, as it does, word blindness and allied conditions, and also touch on the brain conditions, so far as sight is concerned, that go to produce a second-class or a first-class mind, which may be paraphrased with sarcastic reference to the education of the present day, as the "schoolmaster's boy" or the one who proves himself a success in life.

It is advisable to give at the outset what must necessarily from the insufficiency of our knowledge be a rough idea of the path by which those impressions excited in the retina by the waves of ether reach the brain and give rise to what we call a sense of light, and, after further differentiation, we call sight. The retina is affected, so far as the production of the sense of light is concerned, by waves of ether of a length roughly varying between four thousand and nine thousand ten-millionths of a millimetre, which excite in it chemical and electrical changes; the impressions thereby produced pass to the brain by the optic nerve, the retina being a highly specialized expansion of this structure. At the chiasma a partial decussation of the nerve fibres comprising the optic nerve takes place and half of them cross to the other side, thus demonstrating that the nerve supply of the retina is anatomically divided between the two sides of the brain, the dividing line passing virtually through the macula, and although physiologists say that the macula itself is supplied by fibres from both sides of the brain, there is a good deal of clinical evidence to show that this is not the case. Beyond the chiasma the optic nerve is traced as the optic tract, although it must be remembered that the nerve does not represent the whole of this tract. The optic nerve fibres therein pass on to the pulvinar and external geniculate body and the superior corpus quadrigeminum and there end; other centripetal fibres arise in these situations and in the case of the pulvinar and external geniculate body, pass to the brain centre for the sense of light which is situate in the cortex of the occipital lobe in the neighbourhood of the calcarine fissure, those from the corpus quadrigeminum superior passing to the nucleus of the third nerve and doubtless to the other centres for ocular movements. The cortex of the occipital lobe sends centrifugal fibres to the nucleus of the third nerve, and also back to the pulvinar and corpus quadrigeminum superior. In addition to these, important fibres spread from the neighbourhood of the calcarine fissure of each side towards the angular gyri, while some pass

*A lecture delivered on 25th May, 1910, in the Course of Ophthalmology in the University of Oxford.

together from both sides to the neighbourhood of the angular gyrus of the left side forming (in the case of right-handed people), a centre or rather certain centres of visual memory there. These higher centres form connection by means of association fibres with each other, and with other centres of special sense, and together with them are connected with and controlled by a centre in the frontal lobe, which may be said to represent the intellect. The volitional centre for ocular movements is also in the frontal lobe, while the reflex centres for ocular movements are in the neighbourhood of the angular gyrus of each side.

Now, let me simplify this somewhat by saying that the impressions of the waves of ether are conveyed from the eye to the cortex of occipital lobe in the neighbourhood of the calcarine fissure of each side, and on to the neighbourhood of the angular gyrus giving rise to a sense of light and of form, while certain impressions are conveyed from both sides to other parts of the brain cortex, near the left angular gyrus, and are there stored up as memories to be made use of by the centre in the frontal lobe as forming visual judgments. With this scheme clearly in your mind, it should not be difficult to understand the situations that may arise from disease, accident, or under-development.

You will notice that I spoke of the neighbourhood of occipital cortex as being the centre of light and of form. I separated the one from the other, and, although it is obvious that, so far as form is concerned, it is impossible to disconnect it from light (where the sense of light is alone considered), yet it is otherwise with the sense of light, and a moment's consideration will show that form sense entails a very much more elaborate physiological process than light sense, for to receive the former means invoking the aid of the ocular motor apparatus in controlling the co-ordination of the eyes and focussing them, as well as reference to the sense of touch. Although I dare say there may be such, I have not read of any case where from disease the sense of light, without a trace of form sense, remains, yet I have had one such case in my own experience. The facts were as follows.—The patient was an extremely cultured and intelligent man, 72 years of age, who preserved, with the one exception of sight, all his faculties to a very high degree, notably that of music. He could converse brilliantly on almost any subject. His loss of sight had been attributed to unlimited sexual excess. There was, too, a history of syphilis, a more probable cause of his trouble. He had not been able to see people or forms for seven months before he consulted me, at which time he constantly complained of white glare; when his form sense was failing he could recognise people as if through a fog; and blue or violet gave rise to an especial glare, almost amounting to pain. When I first saw him, his discs were pale, but not papery-white, he co-ordinated his eyes, and had in no sense the appearance of a blind man; he could see a sheet of paper as a white glare; he could tell the number of artificial lights in a room by glares in different directions and the fact that he could see a lamp as a glare, even if it fell in the periphery of his retina, is of itself sufficient proof that his blindness was not due to retinal atrophy. His sense of light was, in fact, exaggerated, and he continually wore a a shade; he could, on some occasions, if the illumination was good enough, tell how many men were seated in front of him at dinner by a sense of glare from their shirt-fronts. The only interpretation of his case that seemed intelligible to me was that he had lost all visual impression, save only that of light. If it be not actually the same as that for light, very closely associated with it and with that for form seems to be the centre for colour. There has been some discussion whether differentiation of colour takes place in the brain or the

retina. Some think that there are in the retina substances analogous to the visual purple on which the different colours act, passing the impressions on to different colour centres in the brain. I myself am inclined to believe that the differentiation takes place in the brain. In a typical atrophy of the retina, such as that which occurs in retinitis pigmentosa, differentiation of colour is often preserved as long as a vestige of light perception remains, and the converse is also true that in atrophy of the disc from a descending cause, such as occurs in tabes, differentiation of colour, at any rate for red and green, is sometimes lost before visual acuity to form sense is to any great extent affected. Again, imperfection in colour vision, commonly known as colour blindness, is much more suggestive of insufficiency in a brain centre than defect of the retina, and much of Edridge-Green's work goes to prove this. In connection with this, some physiological facts I discovered from experiments I made some thirteen years ago, but never published, may be of interest. As representing the effect of colour upon the visual apparatus, I took the degree of reaction of the pupil to the stimuli of different colours of the spectrum, and I adapted a photometric procedure in the following way.— I designed a photographic camera with a carrier for the sensitized plate that moved vertically by clockwork at the focal distance of the lens, a flapper moving in front of the edge of the plate and regulated by a tuning fork, made a time record on the edge of the plate ; the patient's head was firmly fixed with the eye in the proper position and in the dark and a very narrow beam of light was then, by a mechanical process, suddenly flashed across the eye exactly illuminating the diameter of the pupil, which photographed on the sensitized plate the diameter of pupil, which by the vertical movement of the plate was converted into a smear narrowing as the pupil contracted and marked off into one-tenths of a second by the intermittent obstruction of the flapper. This showed that there was a latent period of $\frac{1}{10}$ of a second before the pupil reacted to light, and that the maximum response to light took place in the succeeding $\frac{3}{10}$ of a second. In this way I knew that I could use white light to photograph the size of the pupil under any conditions, so long as the exposure did not exceed $\frac{1}{10}$ of a second. I then, by a further mechanical process, illuminated the whole pupil by each colour for one second, at the end of which time I took a photograph of the pupil by a momentary flash. By these means I found that the greatest reaction of the pupil occurred in the yellow of the spectrum, but further observations proved that this was only due to the relatively greater brightness of that part of the spectrum, and when I reduced the various colours of the spectrum to equal luminosities, the reaction of the pupil was infinitely greater at the violet end of the spectrum and regularly declined in degree as the red end was approached, where there was practically no response at all. I do not know that these experiments go to prove much in this connection, but at least they are interesting physiological facts.

As suggesting that the colour centre is independent of the centres for light and form, I saw not long ago a clinical case of considerable interest.— The patient had been a signalman on the main line of railway. His colour vision had twice been examined according to the routine of the service, but unfortunately by an inspector. Subsequently he injured his foot by a nail, and was attacked with tetanus. He was treated by antitetanic serum and subsequently recovered, as it seemed to him, completely, for he was conscious of no defect in his vision until, before returning to duty, he was again examined by the inspector and found to be absolutely without colour sensation. This, of course, raised questions under the Employer's Liability Act and it was for these reasons

that the case came under my observation. Two questions arose : 1, was he malingering ? ; 2, had he always been colour blind ? The first was easily dismissed, for he was most anxious to return to his occupation, which was a good one, and would have to face the second alternative for which the Company would not have been liable, namely, that he had always been colour blind but it had not been detected. This might have been an intelligible explanation under most circumstances, but it was hardly conceivable that he could have done his work for many years without a mistake, carried on, as it was, under such varying conditions of daylight and darkness and fog and, not only as regards the fixed signals, but also requiring interpretation of signals carried on the rear of trains. Moreover, he had never previously experienced the least difficulty in distinguishing the signals, but after his illness, although nothing suggested this disability to him beforehand, he found on looking at the signals that he was unable to distinguish what they were, and this, although remarkable, is on a par with pure alexia that occurs from pathological causes, the patient not knowing he cannot read until he makes the attempt to do so. This case, then, would seem to support the view that there is a separate centre for colour which in this patient had been destroyed.

On the other hand, the fact that all colours when they are intensely bright appear white, and conversely when they are reduced almost to the point of extinction, appear grey would, to some extent, support the idea that the centre for light was itself concerned, which is further supported by the fact that in marked cases of red blindness the centre for light is not stimulated, the individual having no sensation whatever of light when illumination is produced by the extreme red end of the spectrum.

I have spoken, then, of three centres, those of light, form, and colour. Some have suggested, and there are grounds for this suggestion, that there is a separate centre for the macular bundle and that the fibres of each side are represented in the centre of each side. Whether this be so or not, it is useful as an explanation of some conditions that are found in cases of hemianopsia, where there is an additional piece extending into what would be the field of the other half round the point of fixation. I have always a suspicion myself that this small bit of field is due to the fact that the fixation point is not a point, but a small area, and that one can fix on any point of this area and not necessarily at the very centre of it. However, this will not account for the fact that in cases of double hemianopsia there is a tiny field left round the fixation point only. Be this as it may, it is well to bear in mind the theory.

I will now pass on to the consideration of the higher centres for vision. It must be clear, I think, that if the eyes are directed to an object and the cortical centre receives an impression thereof, this impression can not persist when the eyes are directed to another object, for the effect would be like that of several photographs being taken on the same plate. When, therefore, the eyes are moved from one object, the impression should be lost thereof and a "clean slate," as it were, prepared for the next picture. In pathological conditions, notably that in retinitis pigmentosa, one finds the previous image carried on and the fresh image superimposed. I have never known this occur except to a very slight, though definite, degree. This, then, being the case, when the eyes are again directed to the original object, there must be some means by which the individual recognises that he has seen it before. This brings us on to the subject of the centre or centres for visual memory. When the child is learning his alphabet and his attention is directed to the letter A, he is told that that particular combination of marks represents the letter A. The impression of the letter A is then formed on the cortex of the occipital lobe, half in one side and half in the other of the brain, and something else

occurs. The impressions from each side are carried to another part of the cortex of the brain in the region of the angular gyrus of the left hemisphere, and are there stored up for future comparison. The two sides of the brain are thus linked in one common centre. Coincidentally with this an impression is carried from the lower centre for hearing to the centre of aural memory of the sound A, and there are association fibres between these two higher centres, that of visual memory and that of aural memory. The child proceeds with his lesson, and in turn sees and stores up the visual and aural memory of the succeeding letters. His attention then is once more drawn to the letter A. This again impresses the lower visual centre of the cortex of the occipital lobes, but on this occasion the highest centre in the frontal lobe, which has association fibres with all the lower and the higher centres, recognises that there is stored up in the centre for visual memory an object of the same appearance which is linked up with the aural centre, which attributes the sound of A to that object. This volitional centre gives stimuli to the various centres that are associated with the act of speech and the child repeats the word A. As the education of the child proceeds, he links up the letters into small words and these small words may be stored up in the same way as complete entities and so on with longer words, so that words may be afterwards recognised as being composed of single letters and so recognised, or they may be recognised as complete words, the one being obviously a quicker process than the other. Those who have learnt shorthand will recognise that much the same process takes place for those who become expert. The same process takes place with other special things, numerals, music, other languages, and so on and these, I have said, are stored up in the left hemisphere, at any rate, in the case of right-handed people. For more general objects, faces and so on, it is probable that the responsibility is shared between centres on both sides of the brain in the neighbourhood of the angular gyri. We may now understand some of the symptoms that occur in pathological changes that may take place in the brain. Before, however, passing to this aspect, it might be well to emphasise a difficulty I have more or less slurred over, why it is that the visual memory of some things, like faces, are stored up on both sides of the brain, and others, like words, on one side. I suggest the possibility, without any authority for doing so, that so far as sight is concerned it is only these objects that are incomplete without the association of sound and consequently of speech, which are relegated to a special centre for their more compound appreciation. Conversely, the same argument would apply to speech. We know and can understand that when the occipital cortex is destroyed in the neighbourhood of the calcarine fissure of one side hemianopsia results, and we know that the same result will take place if there is complete lesion of any part of the tract between the occipital cortex and the chiasma, and so we can more or less localise the lesion. We may, however, have the lesion in some part of the course of the nerve fibres from the lower centres at the calcarine fissures to the special centres of the cortex near the left angular gyrus. In such cases, if these fibres be the only ones affected, we find that although there is no hemianopsia, yet there are losses in the higher physiological centres, and it is easy to understand what these may be. Supposing the path to the centre for letters is destroyed, the individual will no longer be able to recognise what the letter is that he sees before him. He will be able to see the letter, he will be able to describe it and to draw it, but he will not recognise that it is the letter A. If, however, he is told to write the letter A he will be able to do so correctly, but having written it, he will be unable to recognise that it is the letter A. This will

occur, then, if, as I have said, the lesion is in the course of the fibres from the lower centres to the centre for the visual memory of letters, for such centre will still be active and associated with other special centres concerned in speech and in writing, but if the lesion should be actually at the centre for the visual memory of letters, then there will be no profit in the linking of the centres for speech and writing with this destroyed centre; and when the individual is told to write the letter A, he will be unable to do so, because the visual memory of it is destroyed. Now this kind of lesion may happen to all the special centres or to some of them, but in order to destroy the memory of more general objects, if it be true that they are represented on both sides of the brain, a double lesion would be necessary. Now, I have said that the fibres pass from each of the lower centres to the higher centres on the left side of the brain. A lesion occurring in the course of those fibres from their position might easily include also the direct fibres from the eye to the left calcarine fissure, in which case the individual might not only be unable to recognise letters, but he also would have right homonymous hemianopsia, and such lesions with such symptoms are not infrequently found. As illustration of these kinds of lesion without hemiopic symptoms, I recall the case of a patient whom I saw some years ago. He had had more than one stroke, and when I saw him the symptoms he showed were loss of memory of words, letters, numerals, but when asked to draw the letters of the test types he was able to do so, but he was unable to recognise them as letters. They were mere forms to him that he might never have seen before. He was, therefore, among other things, word and letter blind, but although he was not able to recognise the letters when he had written them, yet he was able to write down the letter when told to do so. This would show that in his case the centre for the memory of letters was not destroyed, but the fibres leading to it. He had further symptoms. He was not able to express his thoughts in words, except in a very incoherent manner. He would use wrong words and meaningless expressions, although at times it was somehow possible to understand more or less what he meant. He showed, then, what may be called word dumbness. He knew what he wanted to say but could not say it, and remembering the points I have tried to explain to you, you will be able to reason out the centres that were affected. But if what I said just now be true, a further remarkable symptom of his can be explained. This symptom was that of being able to recognise people whom he knew, but he was not able to say their names, so we can conclude that the connections of the lower visual centre with the centre for objects of the right and the left side of his brain was intact, but the association fibres with the centre for names and the association fibres of the centre for names with that of speech were interrupted. Now, there was another symptom he presented. When asked whom he had seen out walking, he could draw the picture of the person and thus convey his thoughts. This showed that the association fibres to the centre for writing or drawing were intact. His conditions was certainly a pitiable one, for this was the only means he had of communicating with his people. His mind was quite active, but there was only this outlet from the special centres to those with whom he was living. Now, the loss of power to recognise objects generally is called mind blindness and the other conditions, which are subdivisions of this, are spoken of in the same way, such as word blindness, letter blindness, word dumbness, etc.

So much, then, for these pathological conditions. I now pass on to what is the main object of this lecture, *viz.*, to speak to you of the congenital forms of trouble that go by the name of word blindness, letter blindness, figure blindness, music blindness, etc., and to point out what has not been

generally recognised, that very commonly associated with word and letter blindness is word dumbness. These sound formidable titles, and I have always protested against their use. The congenital form of this trouble is really not disease at all. The condition was once supposed to be rare, but I have for many years pointed out that anyone could recall cases by the dozen if his attention were drawn to the symptoms. Mr. Sydney Stephenson is among those who has done extremely good work in drawing attention to this point, and who has written valuable articles on this question. Mr. Herbert Fisher, too, has carefully investigated these conditions, and explained the fact, admitted by all, that boys are more frequently affected than girls, by birth injury, a meningeal hæmorrhage damaging the brain cortex in that region. The condition has, I think, seemed like disease, because only the most gross cases have been reported, but they are no more diseased than the individual who cannot recognise one tune from another is diseased, or the golfer who always "tops" his ball is diseased, or the cricketer who gets out by the first straight ball. It merely shows that in these particular directions the brain has not any great potentiality. The grey matter concerned in these various operations is less present than in the others who can train themselves to be successful. No brain is very potential in all directions. Each one has its specialities and its insufficiencies. If you bear in mind the association of centres that I have attempted to describe you will be able to deduce the causes of the various troubles, such as word and letter blindness, of which I am especially speaking, although number blindness is probably just as common; if you think of it you will probably be able to recall many children who took a long time to learn to read in varying degrees, some only a little longer, some two or three years longer than usual, and you will be able to recognise that all these are forms of word or letter blindness. How, then, is it produced? One can realise two causes: either one can recognise that the fibres connecting the lower to the special centres are of low order of conductivity, or the cells of the centre itself are poor and insufficient, much in the same way as you may have a poor and insufficient electric battery to ring rather a large bell, and its failure is represented by a feeble rattle of the clapper which has insufficient swing to reach the bell, or the insufficiency of the current may be brought about by the resistance in using too fine a wire to convey the current. If in learning to read every time the child sees the letter A the impression has to pass along the insufficient fibre to the higher centre for comparison, or the grey matter of the higher centre being insufficient, one can readily understand the difficulty and labour of learning to read, and the slowness of the process. If the association fibres with the centre for speech are all of the same insufficient quality, one can easily understand word dumbness being added to the trouble, and the individual who is learning to read aloud under such conditions only does so very slowly and laboriously. Now, there are interesting peculiarities noticeable in such cases. The aural apparatus and centres may be excellent and the learner may very quickly appreciate what he is told while he labours with what he has to read, and these good aural people who are word blind will learn their lessons by repeating them aloud, it being easier to store up the memories of sounds than those of forms. I have said that word dumbness is often associated with word blindness, and the result is much as follows.—The individual by great labour has reached his centre for visual memory, and has recognised what he is looking at—in other words, his highest volitional centre has recognised the meaning of what he is looking at; and has to direct the impulses to be given to reproduce it in speech. The meaning is readily grasped and the difficulty of the visual centre has been got over, but then the

same difficulty begins with the aural centre in reproducing the words in speech, and though the meaning may be correctly conveyed, it may get paraphrased in the process I am showing next week at the Ophthalmological Society the case of a young man of average intelligence who is reading for Holy Orders and has to read the lessons at the theological college at which he is engaged. He is obviously a case of word blindness combined with word dumbness. He was very slow indeed at learning to read, and reads badly now as these word blind people generally do, but when reading the lessons aloud in church his word dumbness is a trouble to him; thus, when he appreciates that the word he sees in the Bible is "Lord," he is just as likely to reproduce it in speech as "God." Such words as "mighty" he would reproduce as "great" and so on, the meaning having been grasped, but the speech centre not being so ready and capable of reproducing the conception. Now the minor degrees of word blindness are well illustrated by the people who take a long time reading a book compared with those who can skim over books and realise their gist with great rapidity. These minor degrees of word blindness are greatly represented in the class "who do not care much about reading" and, as I have said before, if you think of those with whom you have been brought into contact during school life and afterwards, you will be able to recall a great many who really come under this category. A cousin of mine who is obviously word blind and in whom I did not at first recognise the condition, used continually to complain that his field of vision was so small in reading. He was a very slow and bad reader, although a peculiarly able man, but when I had given more attention to the subject of word blindness, I realised what he meant by his symptom. He could probably only grasp the subject matter letter by letter, and was quite unable to grasp words if he ran his eye along the line in the usual way in reading. This leads me up to a series of interesting experiments I made some years ago with regard to reading. I took the *Daily Mail* as the test, about seven words in a line, and I found that about three movements of the eyeball took place in skimming along the line, taking in each sweep two or three words at a time, but that each word was not separately fixed, and also as one would suppose if one thought of it that the eye was looking at words about half a line ahead of speech. With the word blind there has to be a movement for each syllable and in worse cases probably for each letter. The labour of this kind of reading for even the quick-sighted is very great, as will be recognised by anyone who has done much proof reading. What must it be for those who cannot read readily? The method I used for measuring the movements of the eye was an adaptation of the instrument that I used for measuring the size of the pupil I photographed the central light reflex of a bright electric lamp on the cornea with the vertically moving plate. The black point which on the negative would represent the bright central reflex was elongated into a line by the movement of the plate, and each lateral movement of the eyeball was represented by a small step and the final sweep backwards of the eye to the next line was represented by, of course, a much longer step in the opposite direction. Lucien Howe, at about the same time, I am not quite sure whether before or after my experiments, had done the same thing in noting the excursions of the eye. I do not think he had applied it to reading.

Finally, I wish to draw your attention to how these conditions are represented in first-class and second-class brains. After reading anything through, there are two ways at least in which the subject matter can be reproduced to the mind of the reader. He either sees and, as it were, re-reads what he has before seen, or he reproduces the subject matter from its relation to mental conclusions and associations. The one is, so to speak parrot-like,

the other thought out. The one relies upon his visual memory, the other upon a still higher brain centre, or he may, and in most cases he does, rely upon both. Now, the reproduction of events read or heard relying upon an excellent visual or aural memory is very convenient, and it is these boys at school who please their masters and do so well in pure scholarship; but the boy who never knows his repetition and always forgets his dates, but who struggles up to the top of the school, is far more often the master-mind. The boy who always knows his repetition, and who always knows his dates, so often turns out a disappointment afterwards. The boy who knows all the kings of Europe and when they came to the throne, all their dates and all their battles, and who won them, etc., is not nearly so likely to know why the map of Europe is drawn as it is at the present day as the one who has no such command of detail. In other words, the master-mind is his whose higher brain centre has plenty of grey matter of good quality, and is in close and ready association with all the other brain centres, so that his grasp is wide and his judgment good, whereas the other may have only a splendid centre for memory, and have no great power of dealing in his higher physiological centre with the remembered facts. Of course, he who has not only good memory centres, but also a highly developed intellectual centre is best of all, for his *data* are so good that his judgment must be proportionately better; but, as I have said before, and as we all know, if a brain is very highly developed in one direction we are much more likely to find deficiencies in another.

I will just conclude by mentioning the case of a man now dead, whose visual memory was the best I ever knew. He could read a leading article of *The Times* once through, put down the paper, and repeat it word for word. This man, as it happened, had a very fine intellect as well.

As I said at the beginning, this lecture is only a sketch, some of it empirical, and not all the conclusions which I have given you established as facts, but I hope it will form a general ground-work of the subject which I wish to bring before you to-day.

THE OPERATIVE TREATMENT OF GLAUCOMA.*

BY

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THE establishment by von Graefe of the operation of iridectomy for the relief of glaucoma dates back to the year 1857. This operation held its own against all other methods, including sclerotomy and posterior sclerotomy, until the introduction by Lagrange of the conception of a filtering cicatrix.

Lagrange began his advocacy of the new method in May, 1906, in a lecture delivered before the French Ophthalmological Society, and has continued to advance along the path he first marked out. Shortly put, his operation is a combined sclerectomy and iridectomy, the operation being performed close to the limbus with a keratome and scissors.

Herbert, of Bombay, followed with an ingeniously devised procedure, whereby he endeavoured to perform subconjunctivally a sclerectomy, combined with a small iridectomy.

*Read before the Madras Branch of the British Medical Association, Feb. 18th, 1910.

These efforts soon attracted the attention of ophthalmic surgeons, and it is not surprising that they were at first received coldly in many quarters.

In Madras, we meet with an enormous amount of glaucoma, and for a very long time I had been profoundly dissatisfied with the results of iridectomy. To me, the soundness of the new operations appealed so strongly, that I ventured to bring the matter before this Branch some three years ago, and to express the opinion that the day of von Graefe's operation was over, and that its sun had set after nearly fifty years of undisputed supremacy. Your members at that time were so taken aback, that it was suggested that I was taking too hopeful, if not too premature, a view of the case. However, little by little, iridectomy gave ground to the new procedures and the after-results of cases that have come back have given us, in Madras, great encouragement. Major Kirkpatrick, during the fifteen months he acted for me, carried on the same policy, and we not infrequently now see excellent results from eyes which have undergone the operation of sclerectomy in this hospital. Such cases are carefully looked out for, and a note taken whenever they re-appear. A further interesting observation has been frequently made during this transition period. All cases which have undergone iridectomy for glaucoma have been carefully examined if they returned to the Hospital, and in a large number of these which have retained good vision, *a filtering scar has been found to be present;* whilst in the failures no such evidence of filtration exists. Where some degree of filtration exists, blindness appears to be long delayed in its advent.

To both Lagrange's and Herbert's operations certain objections can be offered. It is not easy to graduate the amount of sclera to be removed by the former method, nor is the operation free from the danger of a serious vitreous accident. Herbert's operation is "tricky" and difficult, although when correctly performed, it has yielded us excellent results.

It was such considerations as these which led me to the view that our object might be successfully and easily attained by means of a trephine. I spoke of this to two surgeons well known in Madras, but they did not seem very hopeful as to the result. I should, however, have ventured to perform the operation on a blind eye, but I left Madras sooner than I expected. Whilst I was on furlough the matter was often before me, and I took an early opportunity on my return to put it into execution. The operation proved to be an extremely easy one. The lowering of tension, which immediately followed the operation, was as marked as that obtained by either of the other two procedures. The iris was less apt to give trouble, and the risks were greatly reduced as compared with either of the other procedures.

The operation may be performed under the local influence of cocaine and adrenalin, dropped into the sac. If there is much pain or congestion, or if the patient is unruly, a hypodermic injection of morphin may be given twenty minutes before the operation. In recent cases we have been using subconjunctival injections of cocaine and adrenalin with excellent results. The patient looks down, and a large triangular flap of conjunctiva is dissected up from above the cornea, the attached base of the triangle lying at the sclero-corneal margin. Experience has shown the importance of dissecting this flap right up to the limbal attachment of the conjunctiva. The flap is turned down on the cornea. The spot selected for the trephining should be as close to the limbus as possible, and should be prepared by using the scissor points freely, either cutting or scraping or both, right down to the scleral coat. It is important that no conjunctival tissue be left, as otherwise it will catch in the trephine and tend to draw the flap into the latter as it is working. I never pull on the flap, but simply steady the globe by pressing on the cornea through the down-turned flap; I find this quite sufficient to effect the purpose of keeping the eye

at rest in the proper position. The trephine is used with quick light movements, and care is taken that its first application suffices to bite into the sclera, before it is raised to see the progress made. Once a clean ring is thus started, it is very easy to replace the trephine in it. At first the operator feels the need of frequently removing the trephine to watch progress, but he soon learns to know by the feel when he is through. As soon as the anterior chamber is tapped, aqueous fluid wells up alongside the trephine; even apart from this, there is a curious sucking sensation which tells one the trephine is through. Moreover, the patient often helps by a slight movement due to the pain (seldom severe) which attends the completion of the section. The conjunctival flap is replaced *in situ* to see whether the iris is in position or not. If it is, and if there is no bulging of its base into the wound, the eye is at once closed. It sometimes happens that the iris bulges into the section the moment the disc is cut through; if so, it is snipped with scissors to let the aqueous fluid escape, and it then often goes back of itself. If it does not then, an iridectomy is performed. As a rule, a very small and peripheral section of the membrane suffices; more rarely it is necessary to make the iridectomy complete. We instil eserine drops into the eye after operation, if for any reason we fear a prolapse may take place. As a rule, no drops whatever are used immediately after the operation. We have used a Bowman's trephine throughout in Madras, and are still wavering between one of 2 mm. diameter and one of 2·5 mm.

After I had sent home my preliminary paper on this operation to the Editor of THE OPHTHALMOSCOPE, I was disappointed to find that another surgeon had forstalled me, in so far as the use of the trephine was concerned. Dr. Freeland Fergus' account of his operation reached India in October, and consequently I did not see it until shortly after my paper had left here. We had been working on very similar lines during the same year (he having begun in January and I in August) in complete ignorance of each other's work. There is an important point in which we differ from each other. Dr. Fergus began by performing a simple trephining, but gave it up and combined with it a cyclo-dialysis. I have kept steadily to the simple operation. If the operator allows his trephine aperture to be placed too far away from the limbus, he will enter the supra-ciliary space, instead of tapping the chamber. The result will be that he will not establish a free communication between the chamber and the subconjunctival space. If he then considers tapping of the chamber a necessity, he must burrow his way close to the scleral coat into the chamber, or, in other words, he must add a cyclo-dialysis to his operation, and this is what Dr. Fergus has done. The simple method obviously recommends itself for clean neat working and for simplicity. That it is easy to enter the chamber in the way I have described, is proved by the fact that a few mornings ago I trephined six eyes in half an hour, reaching the anterior chamber and finishing the operation easily each time in five minutes.

At the risk of repetition, there are a few points I wish to emphasise, because they appear to me to be of such great importance :—

(1) It is possible by using the points of the scissors, and dissecting concentrically with the cornea, to get very close up to the limbus. In doing so, one must keep the points directed *towards the plane of the posterior pole of the lens*; one must not dissect tangentially to the eye. If one does the latter one will quickly button-hole one's flap; if the former, one undermines the limbus and makes a deep groove overhung by the latter. It is the making of this overhung groove which determines that one enters the chamber with the trephine with certainty.

(2) If the trephine used is a sharp one, one can quickly, easily, and

certainly cut out a clean disc every time, with the reservation that in a large number of cases the disc remains attached at one small point, where the uncut tissue acts like a hinge; one clean snip of the scissors severs this, leaving a clean cut circular hole with no ragged edges whatever. I have recently made a point of pressing a little more on the corneal than on the scleral edge of the disc I am trephining, so as to make sure of entering the chamber as far forward as possible.

(3) If a clean disc is thus cut out, without undue pressure of the trephine, one comparatively seldom requires to interfere much with the iris (*vide* remarks on this subject).

(4) A Bowman's trephine can be easily sterilised, and if it is properly handled, can be kept very sharp. Our method of sharpening it was devised by my first assistant, Mr. Craggs. He removes the guard (the central male stem) of the trephine, and inserts it into the cutting end of the instrument. By up and down movements he then sharpens the edge of the instrument from within, taking care to press on all sides in turn. Two Bowman trephines have lasted us for 150 odd operations, although they are, I fear, now worn out. They cut cleanly up to the last.

(5) The most favourable size of trephine (in diameter) is difficult to ascertain, until we have a considerable volume of statistics at our disposal, and until these statistics include a period of years in their survey. I am indebted to the ophthalmic surgeons who have been so good as to favour me with their views on this subject. The wide diversity of opinion expressed by equally able men, shows how little we really know on the subject. Roughly, my advisers fall into two classes—(1) those who think the trephine aperture may easily be made too large and so lead to a great permanent lowering of tension, and (2) those who fear that our fistulette will tend to close in time and so should be made large to start with. We mean to try various sizes of trephine, and hope in time to be able to reach a settled opinion. So far we have used two Bowman's trephines right through our operations in Madras; one of these has a cutting diameter of 2 mm. and the other of 2·5 mm. Our leaning is at present towards the latter.

Particulars of operations.

Total number of operations under review 128
Number of primary operations in the series 122
Number of secondary do. 6
(these were performed on four patients, one being trephined thrice).
Number of patients operated on 89
(In 33 patients both eyes were trephined, and almost invariably at the same sitting.)

N.B.—The cases are serial from the commencement of the period in which this operation has been performed in the G. O. Hospital. Cases operated on by other surgeons are excluded, as also are the operations most recently performed.

Of the 89 patients operated on, 54 were males and 35 females. Seventy were Hindus, 10 Mahomedans, 3 Europeans, and 6 other castes.

Of the 122 eyes operated on, there were 7 blind painful eyes, 72 eyes with a vision of hand movements and no more, 23 eyes capable of counting fingers at one distance or another, 20 eyes capable of reading types at various distances.

The 122 eyes may again be classified into—Fifty-seven eyes suffering from primary non-congestive glaucoma. Forty eyes suffering from primary congestive glaucoma. Twenty-five eyes suffering from acute glaucoma,

secondary to the changes which may occur during the maturation of a primary cataract. Four of the blind painful eyeballs fall under the last 25, and the remaining 3 under the preceding 40.

Complications and other events of interest during the operation.

(1) *Site of Operation.*—In 86 of the 128 operations, the flap was placed and the trephining done above the cornea (67·17 per cent.); in 39, the operation was placed below the cornea (30·5 per cent.), whilst in 3 it was lateral (2·34 per cent.). The indication for the flap to be placed below or at the side was in all cases a combination of a blind or nearly blind eye with intractability on the part of the patient.

(2) *Anæsthetic used.*—Double trephining was done under the general influence of scopolamin and morphin, and the local influence of cocaine in 2 eyes; morphine was used as the general anæsthetic, combined with the local use of cocaine in 16 eyes; cocaine (usually combined with adrenalin) was the local anæsthetic (no general anæsthetic being employed) in 109 eyes; cocaine and adrenalin mixture was injected subconjunctivally beforehand beneath the flap area in 1 eye. In cases where marked congestion was absent, cocaine and adrenalin drops, or cocaine alone, proved quite sufficient for the easy performance of the operation. In nervous cases and where congestion was pronounced, a general anæsthetic effect was added by injecting morphine or morphine and scopolamin. In the one case where scopolamin was added to the morphine the results were excellent, but the labour involved is too great to admit of the extension of this method in a Hospital such as this. The subconjunctival use of cocaine and adrenalin in the one case proved to have such excellent results that we are giving it an extended trial, and it bids fair to establish itself as a routine procedure; it makes a congested eye easy to trephine without the use of any general anæsthetic.

(3) *Vitreous Escapes.*—In 128 operations with the trephine, there have been six instances of loss of vitreous (4·68 per cent.). In four of the cases the vitreous was very fluid in consistence, and the loss was free in all. In the two others the escape was very small in amount, only a bead of vitreous being lost. In one of the four there was no vision before operation; the operation was performed to relieve severe pain in the eye combined with headache and vomiting; the tension was at once relieved and remained so for the eleven days he was under observation; the fact that he has not returned would possibly indicate that his symptoms were permanently relieved. In a second case the vision, both before and after operation, was hand movements; the tension was relieved by the operation, but the retina became detached; he disappeared after fifteen days, and has not since been seen; the pain, which was the indication for the operation, did not return whilst he was under observation. In the remaining two cases the tension was relieved and vision was not altered.

I have a very strong impression that the cause of vitreous escape in a considerable percentage of cases is the placing of the trephine hole too far away from the limbus; this places the aperture over the vitreous body instead of over the chamber.

(4) *Failure to enter the Anterior Chamber with the Trephine.*—In five cases I failed to enter the chamber with the trephine and was driven to push a fine curette into the anterior chamber in order to tap the aqueous fluid freely. Of these five cases four did well. In the fifth I was obliged to re-open the wound, to remove impacted iris from it. The tension was relieved and the case did well as long as the man remained under observation, but the secondary operation was one of considerable anxiety, and it is not possible to be confident of the final result.

The method of combining a cyclodialysis with trephining is the procedure adopted as a routine measure by Dr. Freeland Fergus, of Glasgow. I had been under the impression that the above five cases fell into the category of "Fergus's operation." More mature consideration in the light of a recent case, not included in this paper, has led me to the opinion that, with two exceptions, they should not be so classified. All that I really did in the other cases was to either enlarge my trephine opening into the chamber, or in cases where even the minutest aperture into the chamber did not exist, to break through into the chamber. Placing my trephine as I have done, there can, in most cases, have been but a very thin partition between the trephine hole and the aqueous chamber in any case.

(5) *The frequency of iridectomy.*—In the 128 operations a portion of iris was removed on 65 occasions. In 57 the iridectomy was small and peripheral, whilst in 8 it was large and complete. A McKeown's irrigator was found of great service in washing back the iris into the chamber, if it had prolapsed in front of a gush of fluid, on completing trephining. Any difficulty in so replacing it, or any tendency of the membrane to re-prolapse, was taken as indication for an iridectomy. With clean, neat trephinings, performed without undue pressure on the globe, it was found that iridectomy was less commonly called for than was the case in the earlier operations. This is illustrated by the fact that the iridectomy rate was 52·56 per cent. in the first 78 cases, and only 44 per cent. in the last 50. There is reason to hope that one will be able to still further reduce this ratio.

Post-operative Complications.

(*a*) Cases in which a secondary trephining was called for owing to the tension failing to be lowered by the first operation...	4	eyes.
(*b*) Cases in which a secondary operation was required for the removal of iris which had prolapsed into the sub-conjunctival space through the trephine hole	2	„
(*c*) Cases in which a displacement of the iris towards the trephine aperture took place during convalescence, but did not call for any operative interference	10	„
(*d*) Cases in which posterior synechiæ formed during convalescence without pain or other signs of iritis	2	„
(*e*) Cases in which chamber failed to reform within 24 hours of operation	18	„

Remarks.—Class A.—In 118 out of the 122 eyes primarily operated on, the tension was lowered by the trephining, and remained sub-normal or normal so long as the patient remained under observation. In 4, as shown above, the operation failed to relieve the hyper-tension. The serial numbers of 3 of the 4 cases were 23, 27 and 31. They were, therefore, amongst the early cases, and in each one of them it is noted that the chamber did not empty at the time of operation, though aqueous fluid escaped freely. It would seem likely that in these cases the supra-ciliary space and not the anterior chamber was opened. In one it is noted that the trephine was applied too far from the limbus. I fear the same was the case in the other two. A second operation brought and kept the tension down in each case.

The fourth case is harder to understand. Its serial number is 110. The first operation (on 23rd December, 1909) reached the chamber in each eye, and all seemed to have gone well. In the L.E. tension remained reduced during the six weeks the patient was still under observation. In the R.E. the

base of the iris bulged into the trephine hole, and tension rose. On 20th January, 1910, the offending iris was removed, but without relief of tension. On 27th January, 1910, a fresh trephining was done below, and again the iris blocked the aperture and tension was unrelieved, though the chamber was freely tapped. Again, on 24th February, 1910, a fresh trephining was performed (on the outer side). As the chamber was not satisfactorily tapped, a curette was pushed into the chamber close to the scleral coat, thus enlarging the trephine opening. Aqueous escaped freely, and the tension fell below normal and stayed there during the next seven days, after which the patient disappeared from the hospital. I fear that tension probably returned again. The case is one which no explanation seemed to meet. Though the tension on admission was plus 2·0 (3·5 mm. tracing with Maklakoff's tonometer) the cornea was clear, the course had been chronic, and there were no features pointing to an acute course. The patient was most troublesome and unreasonable during the operation, straining and squeezing the eyes throughout.

Class B.—In two cases the iris prolapsed as a result of the operation, in one on the sixth and in the other on the tenth day afterwards. In both the tension which had been lowered by the operation remained below normal. The prolapsed portion of iris was cut off without delay and the course of the recovery was not affected by the complication in one of them, but the other gave ground for some anxiety, though it did well in the end, till it was lost sight of.

Class C.—In ten other cases displacement of the iris towards the trephine hole was noted. In eight of these the displacement was very slight, the tension of the eye remained well lowered, filtration was free, and vision stood in *statu quo ante*. In one a threatening bulging was promptly reduced by eserine, and the patient's vision was better on discharge ten days after operation than it had been before operation. In the remaining case the pupil was distinctly displaced towards the trephine opening, and the patient complained of pain, which was at once relieved by a free iridectomy. Tension remained low after the original operation, being unaffected by the complication, and vision was unchanged.

Class D.—In these two cases the iritis proceeded so quietly that no suspicion of the occurrence of synechiæ arose for some days. I fear that they may not have been the only cases of the kind. The main interest of such cases centres around the post-operative drug treatment of the eye in trephining cases. The eye is frequently congested at the time of operation. If there is a strong tendency to iris-prolapse, one *must* use eserine drops. In my early cases the instillation of this myotic was routine, but it was soon obvious that it was usually unnecessary, and occasionally harmful. We very seldom instil eserine now, and in all cases where the pupil shows a tendency towards contraction during convalescence we do not hesitate to exhibit atropine freely. I am convinced that there is no danger in so doing, and that in such selected cases it is a valuable safeguard. At the same time I should not wish to be understood to be advocating the indiscriminate use of this or of any other powerful drug.

Class E.—In the 128 operations under review, the section healed and the chamber consequently closed: Within twenty-four hours in 110, within forty-eight hours in 10, between the third and fifth days in 7, later than the fifth day in 1 (twelfth day).

If the cases be divided into two series, *viz.*, the first fifty and the last seventy-eight one can see how far advantage was reaped from the early experience, for we were obviously at a disadvantage at first.

The chamber filled within the first twenty-four hours: In thirty-seven cases out of the first fifty (74 per cent.), in seventy-three cases out of the last seventy-eight (93·59 per cent.).

This improvement is to be attributed to clean trephining, associated with a minimum of interference during the operation. The percentage of iridectomies worked out on the same footing sheds an additional light on this subject.

Remarks.—The accompanying table gives the results of the cases which have come back to the hospital for further observation. Every patient has been requested to present himself or herself at three months' intervals, and it will be observed that over sixteen per cent. have re-appeared up to the date of final printing, *viz.*, 5th May, 1910.

The tension was estimated by means of the Maklakoff ophthalmotonometer, and is given in terms of the area of flattening in mm. The lower the reading the higher is the tension, and *vice versa*. The object of using this instrument was to eliminate, as far as possible, the personal factor of an observer who might be prejudiced in favour of a certain trend of results. All the readings alike were taken by an assistant who has had a very large experience in using the instrument.

It will be observed that in only one case did the operation fail to immediately lower tension, and that in that case a subsequent operation did this effectually. It is further noteworthy that the considerable reduction of tension immediately following operation, had given rise to a more normal condition in a number of the eyes on the return of the patients to hospital.

With regard to the fact that several of the eyes gave a reading of over 5 mm. before operation, it is perhaps hardly necessary to remind surgeons that even eyes with well-marked signs of glaucoma show a normal tension at times; indeed, one meets with eyes which are undoubtedly glaucomatous and yet in which it is hard to find a rise of tension during the day-light hours. It is nevertheless necessary to protect such patients against periodical rises of tension which often take place at night.

The visual results speak for themselves. A large percentage of our cases come in with a very chronic and slowly progressive condition of hypertension, and in such cases one does not expect to find an improvement of visual power after operation; if one can check the progressive loss of visual power a great deal has been done for the patient.

It is not pretended that the statistics now put forward make a conclusive case for the operative procedure I have advocated, but they are certainly highly encouraging, when one remembers what the inevitable course of glaucoma is. The present paper merely serves as an interim contribution, partly furnished on account of the interest the members of the Branch have taken in my work in this direction, and partly called for because one feels that in practising a new method of operating it is advisable to collect one's facts at intervals and to scrutinise them carefully in order to assure oneself that it is justifiable to continue to advance on the lines one has marked out.

Serial No.	NAMES.	Side affected	Condition before operation.		Condition after operation.					Time at which the patients were subsequently seen.	Condition lately.				Remarks.
			Tension.	Vision.	Date of reformation of chamber.	Filtration.	Position of pupil.	Tension.	Vision.		Filtration	Position of pupil.	Tension.	Vision.	
1	Hafeesa Bee ...	Right	5 mm.	H.m.	48 hrs.	Free	Central.	6 mm.	Unaltered	37 days after operation	Free	Central	6 mm.	H.m.	
2	D. V. Subbusami Iyer	Right	4 mm.	Fingers at 2 m.	do.	do.	do.	5 mm.	Fingers at 3 m.	2 and 2½ months after operation	do.	do.	5 mm.	$\frac{6}{18}$	
	Do.	Left	do.	Fingers at 1 m.	do.	do.	do.	do.	do.	do.	do.	do.	do.	$\frac{6}{9}$ bar 11	
3	C. Kuppasa ...	Right	6 mm.	H.m.	24 hrs.	do.	do.	7 mm.	Unaltered	9 months after operation	do.	do.	5·5 mm.	F. at 1 m	
	Do. ...	Left	do.	do.	do.	do.	Somewhat displaced upward	do.	do.	8½ months after operation	do.	Slightly displaced upwards	6 mm.	F. at 1·5 ft.	
4	D. Venkatarama Row ...	Right	4 mm.	$\frac{6}{18}$	do.	do.	Central	do.	do.	3½ months and 4½ months after operation.	do.	Central	6·75 mm.	$\frac{6}{12}$ better c glasses.	
5	Do. ...	Left	4·25 mm.	$\frac{6}{18}$ bar 1 ft.	do.	do.	do.	do.	do.	do.	do.	do.	7·25 mm.	$\frac{6}{18}$ c glasses.	
	G. T. Ramanatha Mudaliar	Right	4 mm.	H.m.	do.	do.	do.	5·25 mm.	do.	over 7 months after operation.	do.	do.	6·25 mm.	H.m,	
	Do. ...	Left	5 mm.	Fingers at 2 m.	do.	do.	do.	7 mm.	do.	do.	do.	do.	7 mm.	Fingers at 3½ m.	
6	N. Appavu ...	Right	do.	H.m.	do.	do.	do.	5 mm.	do.	4½ months after operation	Doubtful	do.	5 mm.	H.m.	Was operated for a 2nd time 5 months after the 1st Tn. went down to 7 m.m. and the patient improved in all respects.

Serial No.	NAMES.	Side affected	Condit on before operation.		Condition after operation					Time at which the patients were subsequently seen.	Condition lately.				Remarks
			Tension	Vision.	Date of reformation of chamber	Filtration.	Position of pupil.	Tension.	Vision.		Filtration	Position of pupil	Tension	Vision	
7	T. Bodi Chetty	Left	5 mm.	Fingers at 3 ft.	24 hrs.	Free	Central	7 mm.	Fingers at $4\frac{1}{2}$ ft.	1 month after operation	Free	Displaced	7 mm.	Fingers at 4 ft.	
8	J. Jaganatha Row	Right	4·25 mm.	H.m.	do.	do.	do.	do.	Unaltered	3 months after operation	do.	Central	6 mm.	H.m.	
	Do.	Left	do.	$\frac{6}{18}$ c glasses	do.	do.	do.	do.	do.	do.	do.	do.	do.	$\frac{6}{18}$ c glasses	
9	Anaviya	Left	4 mm.	H.m	do.	do.	do.	8 mm.	do.	7 months after operation	do.	do	8 mm.	Hm.	
10	K. Pappammal	Right	do.	do.	5th day aft. oprn.	do.	do.	9 mm.	do	$2\frac{1}{2}$ months after operation	do.	do.	do.	do.	
11	C. Chinnamma	Left	do.	do.	24 hrs.	do.	Slightly displaced upward	6 mm.	do	1 month after operation	do.	do.	7 mm.	do	
12	C. Subbiah ..	Right	5·5 mm.	Fingers at 2 m.	do.	do.	Central	9 mm.	Not tested	6 months after operation	do.	do.	6·5 mm.	Fingers at 10 m. or $\frac{5}{10}$ E types	Staphyloma very considerably diminished in size in R. E. and practically disappeared in L.E.
	Do. ..	Left	4·5 mm.	H.m.	do.	do.	Slightly drawn up and practically central	7 mm.	H.m.	do.	do.	do.	7 mm.	H.m.	
13	K. Annamma...	Left	4 mm.	$\frac{6}{18}$ c glasses	do.	Good	Central	do.	$\frac{6}{9}$ bar 2 ls. N.I.S.	3 months after operation.	Good	do.	6·5 mm.	$\frac{6}{10}$ E. N.I.S.	Due to Iris adhesions.
14	Miss M. G. Duarte ...	Right	do.	$\frac{6}{24}$ and 2 ls. of $\frac{6}{18}$	do.	do.	do.	do.	Not tested.	8 months after operation.	do.	do.	7·5 mm.	$\frac{6}{24}$ c + 1·5 Sph. = $\frac{6}{9}$ bar 2ls.	
	Do.	Left	6 25 mm.	$\frac{6}{18}$	48 hrs.	do.	Slightly raised	8 mm.	do.	do.	do.	do.	do.	$\frac{6}{18}$ c + 1·5 Sph. = $\frac{6}{18}$	
15	Swami Row ...	Left	4 mm.	Fingers at 3 m.	24 hrs.	do.	Central	5·25 mm	do.	7 months after operation.	do.	do.	6 mm.	Fingers at 5m.	

CLINICAL MEMORANDA.

THE BOVINE TUBERCULIN TESTS IN PHLYCTENULAR DISEASE.

BY

H. Haward Bywater, M.B. (Vict.), F.R.C.S. (Edin.),

PRESTON, ENGLAND.

In an article in The Ophthalmoscope of June, 1910, I gave particulars of a series of twelve cases of phlyctenular disease which had been subjected to the Moro tuberculin test, and expressed the view that the toxæmia present might be that of bovine tuberculosis. I have subjected all these twelve cases, as well as three others, which also had reacted positively to the Moro test with human tuberculin, to a similar percutaneous test with bovine tuberculin. All of these reacted positively to the test with the first application, one case giving a strong, two a weak, and the remaining cases a medium strong, reaction. In no case was there any constitutional reaction. The local reaction (judging by the number and size of the papules and the amount of redness of the skin) was in twelve out of the fifteen cases somewhat greater with bovine than with human tuberculin. In thirteen of these cases I applied the von Pirquet test with bovine tuberculin, in every case with a positive result. I consider the Moro test particularly valuable in estimating the different degrees of intensity in the positive reaction.

AN UNUSUAL OCCURRENCE AFTER ENUCLEATION

BY

James A. Wilson, M.D.,

GLASGOW, SCOTLAND.

Mrs. R., aged 60, complained of pain and loss of vision in her left eye, of some weeks' duration. The vision was reduced to perception of light, the cornea was steamy, and the tension decidedly raised. Iridectomy was recommended, but this she declined. At this time the vision of the right eye was fairly good, but some weeks later it began to fail and evidence of iritis appeared. I now did an iridectomy on the left eye, and later in the right eye also. From these operations she recovered satisfactorily, but after some weeks the left eye became very painful. At a consultation it was decided to remove the eye, and this I did. The procedure at the operation was the usual. After the eyeball had been removed, it was observed that the space it had occupied in the orbit became filled up almost immediately from behind, and that the edges of the lids were pushed forwards. There was almost no hæmorrhage. Then the lids also became swollen, pushed forwards, and tense. A compress of wadding was applied and bandaged on firmly.

The next day the swelling had extended slightly; the lids were bulging, the skin stretched and deeply reddened. On the following day the swelling had extended to the forehead and temple. The lids were now purple and glistening, the circulation had almost reached the stage of stasis, and it was feared the parts might slough. The external canthus was snipped in order to relieve tension. An incision was made through the upper lid into the orbit

and drainage tubes were inserted. After this, the condition gradually subsided and in some weeks the parts had almost returned to the normal, but some discharge continued to come from the socket. This discharge was due to diseased bone, for, at a later date, there came away a piece of bone, about the size of a split pea.

This unusual occurrence was due to hæmorrhage and the retention of the blood within the tissues of the orbit. The posterior part of the capsule of Tenon was in some way carried forwards or inverted and thus blocked the outward escape of blood. The proper treatment for such an occurrence would be to incise the capsule and allow the blood to escape.

AMAUROTIC FAMILY IDIOCY.—NOTES OF A CASE.

BY

ERIC BELLINGHAM SMITH, M.D.Lond.

ASSISTANT PHYSICIAN TO THE QUEEN'S HOSPITAL FOR CHILDREN, LONDON.

IN describing the clinical notes of a case of a disease, the characters of which are already well-known, an excuse is usually sought in the fact that such a case presents features which differ from the usual type. In this case, however, there can be no claim to present any symptoms which are extraordinary.

I have ventured to publish these notes for two reasons:—first, the disease is exceedingly rare, any facts therefore concerning it, whether they throw light or not on its underlying cause, must be of value. Secondly, it is a disease which exemplifies the extreme value of an ophthalmoscopic examination as an aid to medical diagnosis.

We find from the history that the infant S—— G——, a female, the third child of Jewish parents, was brought to the Queen's Hospital at the age of 11 months, for "blindness, inability to sit up or hold her head up properly." These symptoms were first noticed at the tenth month, although the mother acknowledges that the child has never at any time been able to sit up. The two elder children are perfectly healthy; there have been no miscarriages; and nothing is known of any similar complaint affecting any branch of the family.

From birth up to the time of admission to Hospital the infant has always been breast-fed, and, moreover, there appears at no time to have been any difficulty in swallowing.

On examination, although the child is exceedingly fat and well nourished, the general condition and aspect is one of extreme apathy Patient lies on her back, unable to turn from side to side, or to roll over—occasional slight lateral movements of the head occur; while those of the limbs, although present, are extremely limited in character. There is no attempt made to grasp or to hold things, probably due to the deficient sight. Such movements as occur are generally in response to handling, and this frequently elicits a feeble cry, as if productive of pain.

A further examination of the limbs reveals a variable degree of rigidity, sometimes feeble, at other times not in excess of the normal hypertonicity of the healthy infant. This spasticity, when present, is greater in the legs than in the arms. If the latter be examined, the forearms will exhibit a curious feature not uncommon in this disease: they are held flexed on the upper arm, and fully pronated, and if supination be attempted the movement cannot be completed. The tendon reflexes are present and inclined to be brisk, the

plantar reflex is flexor. Any muscular wasting, if present, is hidden by the excess of subcutaneous fat. Sensation, as far as can be elicited, is unaffected.

The mental condition is perhaps placid rather than apathetic; no notice is taken of anything said, but there is a distinct appreciation of the bottle, and the child cries when it is removed. Since the patient has been under observation, occasional short loud cries have been heard, similar to those that are found in meningitis.

The child is quite unable to sit up, but if the back be supported, she is capable of holding up her head unaided. The lolling movements of early infancy are, however, present. This last symptom is unusual, as marked weakness of the neck muscles with complete inability to support the head is, as a rule, one of the earliest features of the disease. The head itself is normal in size, $17\frac{3}{4}$ inches. The fontanelle is not abnormally patent, and, although full, is not distended. Lumbar puncture reveals no excess of fluid, but rather the reverse. The removal of 3·cc. caused an immediate depression of the fontanelle. A bacteriological examination of this fluid was negative, and Wassermann's reaction yielded a like result.

The eyes exhibit the random, aimless, periodic movements of the blind, but there is no true nystagmus. There is a slight convergent strabismus of the left eye, otherwise the movements of the eyeball appear perfect in all directions.

The pupils react very sluggishly to light. No notice is taken of surrounding objects, but there is definite perception of a strong light.

The other systems are healthy. The temperature is normal. During the month that the child has been under observation there has been a total loss of weight amounting to 11 ounces, and continual protrusion of the tongue and occasional chewing movements of the jaw, have become additional features of the case. At the same time the two lower central incisors have appeared. There is no difficulty in swallowing.

We have here, then, a case shewing mental torpor, marked muscular weakness, slight spasticity and blindness, symptoms, all of which are compatible with a diagnosis of amentia or cerebral diplegia. If, however, an ophthalmoscopic examination be made, there immediately appear those changes in the fundus which are characteristic of amaurotic family idiocy. These changes are bilateral and symmetrical, and consist of marked pallor of the optic discs, which in this case shew a dark encircling ring of pigment. The vessels themselves are little altered in size, while in the macula lutea there is a roughly circular area, about $1\frac{1}{2}$ times the size of the disc, greyish-white in colour with soft woolly edges, the whole surrounding a bright red central spot.

Remarks.—Reference to previously recorded cases indicates that the disease is a family one, occurring only, so far as is at present known, amongst Jews; that it is slightly more common in girls than boys; that it appears about the third or fourth month of life, occasionally the symptoms seem to be delayed until the sixth or eighth month; and that it usually ends fatally between the first and second year.

It has been divided into three stages.[1]

A first stage associated with slight weakness of neck and back, and perhaps lack of power of observation. This stage passes imperceptibly into a second, where increased muscular feebleness, mental apathy, loss of sight, and hyperacuity of hearing—evidenced by sudden shock-like movements when a loud noise is made—are the main features. The third stage is indicated by the onset of wasting rigidity and muscular atrophy, increased reflexes, tetanic-like spasms, permanent head retraction, and other minor symptoms.

Death, which is invariable, takes place slowly from exhaustion, or occurs

suddenly before the third stage of the disease is reached; occasionally, it is heralded by a rise of temperature, more rarely by symptoms resembling meningitis.

Treatment there is none: many drugs and various glandular extracts have been tried with no avail. Those who follow the theory that the mother's breast milk is responsible have advocated bottle-feeding in the future. The cases are too few to judge of the possible influence of any one line of treatment.

It is interesting to review briefly the pathology of the disease, which has been completely elucidated by the researches of Drs. Poynton, Parsons, and Gordon Holmes[2]. These observers have shown that there is a widespread degeneration of the nerve cells throughout the body. They conclude that it is a primary disease of the nerve cells with secondary degeneration of the nerve fibre, affecting the whole of the central nervous system, dorsal root nerves, and retinæ—not in any way due to inflammation or produced by vascular disease.

They dismiss such theories for causation as may be included under the terms—arrested development, bacterial toxæmia, and abiotrophy, and hold that it is a disease due to some "inherent biochemical property of the protoplasm of the cell."

The pathological changes present in the eye are caused by an extensive degeneration of the ganglion cells of the retina, with atrophy of the optic nerve fibres—while the characteristic appearances in the macula lutea are produced by.— (1) A thickening of the retina by œdema or coagulated exudate in outer molecular and nuclear layers of the retina. This change gives rise to the greyish-white area. (2) The vivid red central spot is caused by a thinning of the retina over the fovea centralis allowing the chorio-capillaris to shine through more brightly, the contrast being increased by the surrounding pallor of the œdematous retina.

As far then as we can judge from previous cases, the patient above, from her symptoms, has reached the second stage of her illness, and the commencing loss of sight, and slight spasticity, warn us that she is probably now entering her third. Further, except for the power retained in the neck muscles and the absence of shock-like movements, she presents no symptoms out-of-the-common.

REFERENCES.

(1) **Kingdon and Risien Russell.**—*Trans. Med. Chir. Soc.*, Vol. 80, 1897.
(2) **Poynton, Parsons, Gordon Holmes.**—*Brain*, 1906, p. 181.

NOVELTIES.

THE DIAPHRAGM TEST: THE NEW REGISTERING INSTRUMENT AND ITS MODE OF USE.

BY

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In the original model of the Diaphragm Test, of which a description appeared in The Ophthalmoscope of May, 1909 (p. 330), it was suggested that the test would prove of value for the following purposes:—

1. To determine the equality of visual acuity in the two eyes.
2. To determine the presence, the absence, or a defect of binocular vision.

3. To exercise the vision in squinting eyes.
4. To detect malingerers feigning monocular blindness.
5. To demonstrate certain physiological phenomena connected with the perception and suppression of images.

I venture to think that at this date these suggestions have met with a reasonable measure of justification in the considerable use to which the test has been put.

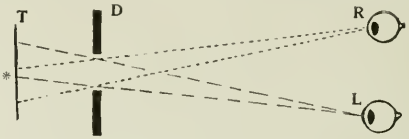


Fig. 1.—Lines of vision through the hole in the screen of Diaphragm Test.
*Marks band of test card seen by both eyes, the *ocular-poise*.

The new registering form of instrument has arisen out of a series of experiments with the original pattern, is a natural development therefrom, and I believe is calculated to do useful work and to elucidate some

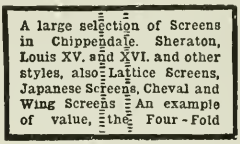

A large selection of Screens
in Chippendale. Sheraton,
Louis XV. and XVI. and other
styles, also Lattice Screens,
Japanese Screens, Cheval and
Wing Screens An example
of value, the Four-Fold

Fig. 2.—The dotted lines enclose the band of print seen by both eyes, the *ocular-poise*.

points in the intricacies of binocular vision. The original model has a fixed aperture of 17mm. in the screen. When the average normal-sighted man looks along the base board through this hole, he sees the test-card perfectly;

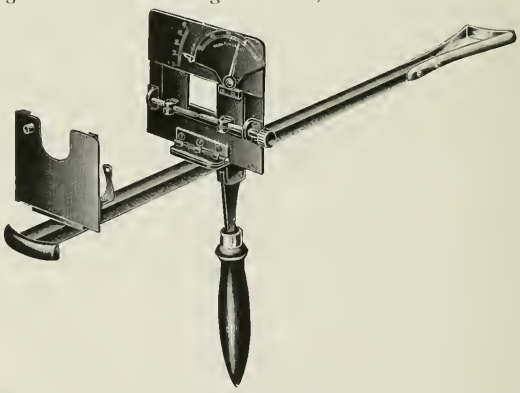


Fig. 3.—View of Registering Diaphragm Test, with variable aperture and adjustable scale for measuring the ocular-poise.

as the diagram shows, the right and left wings are seen by the left and right eye respectively, and a narrow median band of the test card with both eyes simultaneously. This median band forms the balance upon which he main-

tains his binocular vision ; and since this band becomes the centre of interest in this new application of the test, I propose to call it the *ocular-poise*. It is to the eye-controlling mechanism what the ground upon which we stand is to the body-balancing mechanism. And its necessary breadth varies with individuals even as the power of balancing the body upon narrow supports.

The dimensions of the original instrument and of the hole in the screen were planned to give an ocular-poise 4 mm. broad ; a width sufficient to give the average man with a 60 mm. ocular base-line (when fixing the test card at 44 cm. distance) an easy balance for his eyes. Certain experiments with this instrument led me to conclude that its value in certain directions would be greatly enhanced if it were possible to : (1) Adjust the conditions of the test so as to make them identical for each person whatever be his base-line. (2) To measure the width of the ocular-poise necessary for the maintenance of his eye balance.

The new registering instrument enables these conditions to be fulfilled, for the aperture in the screen is variable. On the back of the screen can be seen the necessary mechanism. The sides of the aperture are formed by two shutters sliding in grooves and geared together by a double acting screw. The movements of the shutters are communicated to a needle which sweeps over a quadrant scale, and the figure the needle registers is the measure of the ocular poise in millimetres exposed at that position of the shutters. The quadrant scale of the ocular-poise is movable, so that it can be adjusted to the ocular base-line of any patient, and the conditions made identical for all patients.

The mechanism is the outcome of a number of experimental models, particularly for the setting of the scales, and in this last I have been much aided by the mathematical work of Dr. Bruce Ferguson, whose calculations appear in full elsewhere.*

To be of any use such an instrument must be a fine piece of workmanship, and in its finished form it is something of which its makers† may be justly proud.

To measure the Ocular-poise.

(1) Make the eyes as nearly emmetropic as possible with appropriate glasses and for patients over 45 years of age supply such aid to accommodation as the distance of the test type at 44 cm. will require. Hypermetropia, myopia and stress of accommodation affect the delicacy of this test considerably.

(2.) Measure the ocular base-line for a fixation point at 44 cm. To get good comparative results accuracy is needed. The measurement can, after a very little practice, be obtained accurately and quickly with the new ophthalmic calipers shown to the Ophthalmological Society. The quadrant scale of the instrument is now set to the base-line measure.

(3.) Let the patient take the handle of the instrument in both hands and place the face-piece against the upper lip just beneath the nose. The surgeon holds the T-piece at the other end to keep it steady. Put a test card of the smallest type the patient can read with ease at 44 cm. distance into the rack, and, with the aperture open so as to give a wide ocular-poise of say 10 mm., let him essay to read the first line. If he can do this, turn the screw so that the ocular-poise is reduced to 5 mm., and let him try the second line. And so reduce the ocular-poise with each line of the test until the patient begins to hesitate in reading *the middle of the line*. Note the ocular-poise registered. Then repeat more carefully, warning the patient to stop reading immediately

* *Trans. Ophth. Soc. U.K.*, 1910. Fasc. 1, p. 56

† Messrs. Geo. Culver, Ltd., London, N.

the middle word or letter of a line becomes confused or overlapped (*i.e.*, esophoria becomes apparent), or when it becomes doubled or a black line appears in the middle—(exophoria).

If the patient should fail to understand what is meant by confusion in the middle of the print, turn the screw so that the needle sweeps to the wrong side of zero, then the middle letters will be completely cut out from view. It is well to tell the patient to look across the room between the first and second or more tests, to allow him to regain his disturbed eye balance and relieve his attention.

The significance of the Ocular-poise.

Our present tests for binocular vision fall for the most part into two groups.—1. Those that tell us the patient has or has not binocular vision, but in the event of failure give little or no indication of how near to, or far from, its attainment he is. Of such are Hering's drop test, stereoscopes, the diploscope and the diaphragm test with a fixed aperture. 2. Those that give a measure of his capacity, but in a mixed fashion, for they depend upon muscular effort as much as upon binocular constancy. Of these are the prism fusion tests, and the adjustable stereoscopes. The muscle stress involved in these tests is evident by the brow ache produced by too prolonged or severe experiments with them.

The exquisite rod test of Maddox differs from both of these orders of tests. It does not involve abnormal muscle stress, yet it will tell whether or no there is binocular fixation and what variation if any there be from it. But by the nature of the test, the fusion of a line and a spot of light—a feat that bears no relation to natural conditions—the essential cerebral stimulus of mental desire is lost.

In the measure of the ocular-poise the full mental desire, and therefore the capacity for binocular vision, is retained and stimulated. A test type of intelligible reading matter presents to the man who can read an appropriate mental stimulus; he will read it, and therefore compel his eyes to the necessary balance if he can. The test presents the difficulty of keeping two narrow overlapping bands of print accurately fused, the difficulty of that narrow ocular-poise becomes the measure of his cerebral control over his eyes or his desire for binocular vision. The delicacy of the test is well shown by the fact that a wider ocular-poise is required when the subject matter of the printed test is unintelligible because in an unknown language. More striking evidence of the essential cerebral nature of binocular vision could scarcely be desired.

The Variation of the Ocular-poise.

The ocular-poise varies for individuals and for the same individual under different conditions. The average for a man lies between 2 and 4 mm. Some require a less and others a greater measure. A few can under the best condition keep a balance with the ocular-poise reduced to less than 1 mm., or even 0. But the subject to attain this must be in a good state of health; there must be emmetropia; and the test card used must convey an intelligible meaning to the mind. There are quite a number of people who require an ocular-poise wider than the average up to 6, 7, or more millimetres; yet the state of their eyes and balance gives no hint of any disability or latent squint. A further class requires the ocular-poise broadened to from 7 to 10 mm.; these are the people who exhibit heterophoria, they may

not pass stereoscopic tests, or do so only when bold and simple pictures are presented to them; yet they do not show an actual, if only latent squint. Beyond these we get a class who require an ocular-poise of from 10 to 15 mm.; these are they who when trouble or fatigue comes upon them show an actual squint; on the evening of a busy day or in moments of excitement one eye diverges; they are unconscious of it, but rectify the squint on being told of it. They can rarely pass any stereoscopic test: with the Maddox rod they frequently give no indication of squint for they promptly suppress the vision of the squinting eye. With the diaphragm test of fixed aperture they will say that on looking through the aperture they see one half of the test card fly outwards in correspondence with the sudden divergence of the uncontrolled eye.

The ocular-poise varies in the same individual. That fatigue effects the capability for binocular vision is evident in cases of latent squint; the same effects, but in a lesser degree, can be found in all, even in those with the finest powers. The phenomenon of diplopia in certain toxic conditions, *e.g.*, alcoholism, is well known: this is but an exaggerated form of a natural diurnal variation. After a hard days work we require a rather wider ocular-poise than in the morning when we are fresh. I am just now engaged in investigating these effects in school children with the intent to measure the fatigue produced by varying conditions of school work.

The Practical Uses of the Ocular-poise.

1. *Heterophoria.*—The measure of the ocular-poise indicates the liability of the patient to heterophoria and latent squint, the wider the measure the greater the likelihood of difficulty. The inherent tendency of such eyes is seen by the confusion of the print when the narrowest measure of ocular-poise is reached: loss of middle words or letters indicates esophoria; reduplication indicates exophoria. Also when the narrowest ocular-poise is obtained any tendency to hyperphoria is made manifest and can be measured in prism degrees with the scale test cards.*

2. *Training.*—The particular value of the test lies in its utility as a "finishing school." for those whose squints are nearly corrected by operation and by means of training, and also for cases of latent squint such as I have described above.

The test is no use in cases of gross squint; for such the adjustable stereoscopes and the instruments of Priestly Smith and Worth are the appropriate modes of investigating and stimulating the desire for fusion. But as a finishing school, for improving the acuity of the defective eye, and practising the finer grades of balance it is of great value.

Particularly is it valuable for cases of occasional divergence. Up till now we have had to rely upon rather uninteresting exercises in convergence, which were rarely followed up for any length of time. But in this test there is something that is a source of interest to patients so that they practise it assiduously. The patient's cheap pattern of the test is being altered so as to allow the aperture of the screen to be varied; the aperture will be cut widely and can be narrowed by moving two slips of metal from either side. To make use of this we first find out their normal ocular-poise with the registering instrument, start them practising with an aperture wide enough to give this ocular-poise, and by gradually narrowing the aperture, they can cultivate a more stable control. We may subsequently re-examine and measure any progress attained. This device will help us in those fairly common cases of

Trans. Ophth. Soc. U.K., 1910. Fasc. 1, p. 52.

occasional squint in which until now we have been well nigh helpless. For the test is distinctly amusing, it is appreciated by patients, and it develops a spirit of emulation with their better equipped friends.

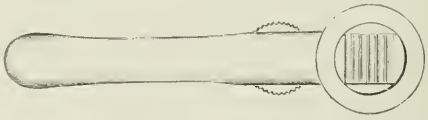
3. *Malingerers.*—There are not many of these folk, but the possibility of meeting one and flooring him is always a pleasant source of anticipation. This test is well nigh perfect for such a purpose, provided always the test be used objectively : that is, the answer be looked for in the presence or absence of co-ordinate movement of the patient's eyes as he looks from one to other half of the test object exposed. By way of refinement in examining the subjective impressions of such a patient the variable aperture comes in nicely. If after examining the patient's eyes as regards fundus, media and refraction, we conclude that the visual acuity of his pseudo-amaurotic eye is equal, or can be made equal, to that of the other eye, we can use a reading test. His base-line should be measured, and the aperture of the diaphragm set so as to give a certain ocular-poise. The aperture may be set for an ocular-poise of any number of letters, or the whole of the letters may be exposed to both eyes just as we please. Say the line chosen is 01234567890, and we set the aperture for so many millimetres of ocular-poise as will include the middle figures of 456, then a man with only right-eyed vision would read 0123456, and the man with only left-eyed vision 4567890. Were the man a malingerer he would have to be an uncommonly astute one to know where to begin and where to end his one-eyed reading.

In conclusion, there are many other points of interest concerning the phenomena elicited in using this test, and in particular the correlation of the results obtained with this test and with other quantitative tests of binocular vision, to which reference might be made ; but on these points more extended observations are required.

ROTATING RODS.

For Muscle Testing.

A convenient little piece of apparatus, devised by Mr. Sydney Stephenson for use in muscle testing, is a set of Maddox rods fixed to a rotating disc with a handle attached.



The instrument is held by the patient, whose forefinger, operating upon a milled wheel, which projects from the side of the handle, causes the rods to rotate.

The instrument is neatly made of dull black metal with polished vulcanite handle. Price 10/6.

It is made by C. W. Dixey & Son, 3, New Bond Street, and 20, Welbeck Street, W.

TRANSLATIONS.

DIVISION OF THE CILIARY ZONE OR CILIAROTOMY: A NEW OPERATION DESTINED TO COMBAT CERTAIN FORMS OF GLAUCOMA UNRELIEVED BY IRIDECTOMY.*

BY

DR. CHARLES ABADIE,

PARIS, FRANCE.

IN the course of a communication upon the pathogeny and treatment of glaucomatous conditions made in 1909 to the French Ophthalmological Society, I brought forward the fact that an irritation of the ciliary region might provoke glaucomatous accidents as this in certain forms of choroido-retinitis affecting the equatorial regions. These cases are sometimes accompanied by marked elevation of the intra-ocular tension, and they require for cure a two-fold treatment in the shape of general measures by mercurial injections and local ones by iridectomy.

Thus, convinced, on the one hand, that irritation of the rich circular nervous plexus which covers the ciliary zone immediately behind the insertion of the iris (*see* Fig. 1) might induce a glaucomatous condition, I thought, on the

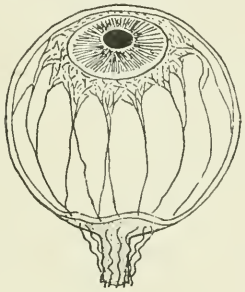


FIG. 1

other hand, that in certain forms of glaucoma the division of the nervous circle might have an action comparable with the division of the nervous circle of the iris. In a word, that section of the ciliary nervous plexus, which I call "ciliarotomy," might exert an anti-glaucomatous action much as section of the nervous circle of the iris does in iridectomy.

In fact, I believe that in glaucoma the division of the iris, necessarily including section of the nervous plexus which runs through it, suffices to cure glaucoma, an opinion based upon the following observations:

No matter how small the breach in the iris, the curative action is just as great as when the breach is large and wide. Moreover, contrary to the view held by a certain number of ophthalmic surgeons, the filtration of fluids through the scleral cicatrix is not the true cause of the reduction in tension, for when the section is almost corneal and the cicatrix is almost

*From *Archives d'Ophtalmologie*, mai, 1910.

closed, a number of cases of glaucoma treated by iridectomy are cured, with normal tension.

Guided by these considerations, I decided to try division of the ciliary nervous circle in order to combat certain forms of glaucoma, of which, to my mind, the *point de départ* was to be sought in an irritative condition of that plexus.

The attempt would once have been regarded as dangerous, at a time when the ciliary region was looked upon as a kind of *Noli me tangere* on account of the risks of infection so much dreaded in that region. But to-day, with careful asepsis, the dangers of infection when dealing with that region may assuredly be put aside. Apart from infective complications, there remain the inherent risks of intervention—that is to say, injury to the vessels and nerves of the region, and to important neighbouring organs, such as the lens, the zonule of Zinn, and so forth. But my personal clinical experiences, and those published by others, have proved to me that accidental injuries of this region (traumatisms often of considerable gravity) if protected from all risks of infection, heal perfectly and without serious consequences as regards vision.

Therefore, it was not by chance and not without mature consideration that I decided to try section of the ciliary zone in certain cases of glaucoma. It was necessary first to select suitable cases.

My first operation was upon a woman affected with absolute glaucoma. Perception of light was absent, and the eye was in a state of glaucomatous degeneration—*i.e.*, varicose dilatation of the pericorneal vessels, dirty-looking sclera, and cloudiness of the cornea. The eye was so painful that enucleation would eventually have been necessary. The immediate result of the operation in this case was complete cessation of pain, reduction in the redness of the eyeball, and a return to normal pressure.

In another patient, affected with haemorrhagic glaucoma, where the small circle of the iris had already become rusty-coloured, and the pain was of that extreme violence which usually calls for enucleation, section of the ciliary zone gave a perfect result, which has been maintained since the operation.

I have also had occasion to intervene in a case where the effect of ciliary section was most conclusive. The patient, a young man, was affected with sympathetic ophthalmitis of the left eye, consecutive to a wound by a piece of stone. When he came to my *clinique*, the wounded right eye, although completely lost, had unfortunately not been removed, and the left eye presented the most serious type of sympathetic disease, namely, the glaucomatous form. Despite enucleation of the right eye, despite mercurial injections (1 : 500) into the apex of the orbital cone on that side, and despite intravenous injections of mercury, the left eye failed to improve. The dull and infiltrated iris was totally adherent to the lens, the pupil was covered with a slight greyish exudation that rendered exploration of the fundus difficult, and the intraocular tension was very high. Sight was reduced to simple qualitative perception on the temporal side. In these circumstances the position was truly desperate. Knowing how disastrous iridectomy is under these conditions I resolved at first to make simple punctures into the vitreous body near the equator of the globe, together with the intra-ocular injection of a drop of 1 : 1,000 solution of sublimate.

Following the first injection, there was delay and a slight improvement, but at the end of a few days, the tension rose again, and the sclera became humped (*se bosselait*), forming a projection at the level of the puncture. A second and then a third puncture, with injection, were made at intervals of a fortnight, always with the same result—transitory improvement followed by return to the former state.

Much against my will, I then resigned myself to perform iridectomy, the result of which was deplorable. A piece of iris, soft and friable, having been excised with difficulty, one found in its place a greyish exudation, which only became thicker during the following days, while the intra-ocular tension, instead of falling, became higher than it was before. Under these conditions I decided to practise section of the ciliary zone, an operation performed without accident. As a result, the intra-ocular pressure fell, and has remained almost normal since, the field of quantitative perception became larger as regards the nasal side, and there was even a little return of qualitative perception, the patient being able to count fingers at a distance of some *centimètres*. The case was shown last year at the meeting of the French Ophthalmological Society, and I have seen it since. The situation is slightly improved, and the intra-ocular tension has not gone up again. The small scleral elevations, which once existed at the level of the old punctures, have disappeared; the eyeball has assumed its regular and normal form.

The foregoing case is particularly instructive, for it shows well that ciliary section does not act in the same way as a simple scleral puncture, since those made in this region had no influence upon the state of the intra-ocular tension.

The *technique* of the operation is simplicity itself:

A fold of the bulbar conjunctiva is raised by means of forceps towards the supero-external quarter of the cornea. The conjunctiva, raised with fine dull-pointed scissors, is divided in the direction of the corresponding meridian of the eye for about 1½ *centimètres* (*see* Fig. 2). The conjunctiva being thus cleft, one

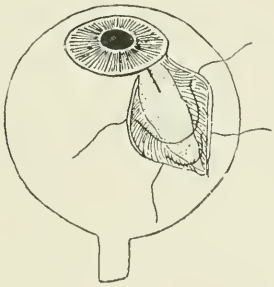


Fig. 2.

takes the superior flap and with ordinary strabismus scissors detaches it from the sclera while raising it up, taking care, in order to disengage it well, to liberate its attachment to the sclero-corneal limbus by small cuts of the scissors. The inferior flap is treated in a similar way. By these means a large triangular surface of the sclera is bared, the base of which is formed by the cornea and the apex by the terminal point of the conjunctival opening made in the first instance. A couple of sutures are now passed through the two conjunctival flaps, whereby they may be brought together in order to cover the wound which is about to be made in the ciliary region.

The sutures once in place, both are pulled outward in such a way as to expose the field of operation. Then, seizing with fixation forceps the conjunctiva and the episcleral tissue at the level of the inferior conjunctival flap, so as to keep the eye perfectly steady, the point of Richter's triangular

knife is inserted just at the junction of sclerotic and cornea, immediately behind the insertion of the iris. It is gently plunged, so to speak, into the globe, its point being directed towards the centre, and its blade in the corresponding sense of the eye (*see* Fig. 3). In consequence of its triangular

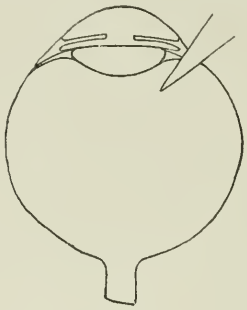


Fig. 3.

form, its propulsion towards the centre of the eye causes its cutting edge to divide the ciliary zone. By slight sawing movements of the blade, this section is enlarged in such a way that it attains a length of from 7 mm. to 8 mm.—that is to say, about the extent of the ciliary nervous plexus. The knife is then withdrawn. Contrary to what might be expected, only one or two drops of vitreous issue from the incision, which is only a mere slit.

Then, by trying the two sutures previously placed in the conjunctival flaps, the conjunctiva is brought together, thereby covering the scleral surface and the incision that has just been made

Up to now, the results of the operation have been uncomplicated, and, contrary to what might be looked for, there has been no luxation or subluxation of the lens, no intra-ocular bleeding, and in cases where the media were transparent, I have never observed any appreciable lesion.

In cases of glaucomatous degeneration and of absolute glaucoma, the effects are remarkable. Intra-ocular tension diminishes ; pain disappears ; and, in a word, the results are as complete as if the eye had been removed.

Lastly, and the point is a capital one, I have performed my operation in cases of glaucoma where after a more or less prolonged period of calm produced by iridectomy, glaucomatous complications have again declared themselves. In such cases section of the ciliary plexus has brought tension to normal, and *restored the lost sight.*

The following case is most demonstrative in that respect :

In November, 1904, Madame B——, a dressmaker, aged 47 years, who had enjoyed good health until then, developed, after a somewhat violent headache, bilateral visual disturbances, fogs, and black shades. The sight failed rapidly to such a degree that a fortnight after the symptoms declared themselves, she was scarcely able to get about by herself. This was the state of things when the patient presented herself at my *clinique*. Subacute glaucoma of both eyes was present, with dulness of the cornea and very high intra-ocular tension. Iridectomy was at once performed upon the right eye, and a week later, the left eye was operated upon in a similar way. All the glaucomatous phenomena disappeared, and sight recovered to such a point that the patient was able to follow her occupation for several hours a day.

The condition remained satisfactory for four years. In October, 1909, however, the sight of the left eye, which had seemed to be in the same state as the right, failed again, peri-orbital pain came on affecting the left side, and vision was reduced to simple qualitative perception of light. In short, the eye had become glaucomatous as formerly.

Despite repeated instillations of pilocarpine and the administration of quinine sulphate, the situation did not change: tension remained very high, the cornea was dull, and there was simple quantitative perception of light. On November 17th, 1909, I performed section of the ciliary plexus, and after the operation, there was progressive disappearance of all the glaucomatous phenomena, and the visual acuity rose little by little to one-quarter.

I have seen this patient regularly once a week since. In April, 1910, seven months after operation, the situation was still the same, and sight was maintained at one-quarter.

It is far from my intention to wish to substitute ciliarotomy for iridectomy in cases of ordinary glaucoma. Iridectomy has proved its value for a long time and in every part of the world. It is simple, efficacious, and remains a marvellous therapeutic conquest. In acute glaucoma or in sub-acute cases, with intermittent crises, it is, and probably always will be, the operation of choice.

On the other hand, ciliarotomy will be found valuable in cases of glaucomatous degeneration or in absence of the anterior chamber and when atrophy prevents the iris being seized with the forceps and cut.

In such cases in order to get rid of persistent pain, with an increasing unsightly deformity of the eyeball, one was compelled to practise enucleation. But section of the ciliary plexus causes pain to cease, diminishes tension, reduces the volume of the eye, and thus allows the organ to be retained.

But it is especially in cases of glaucoma which persist despite iridectomy or relapse after that operation that section of the ciliary plexus is likely to acquire capital importance. In fact, up to now these cases were incurable: neither a second iridectomy, nor sclerotomy, nor myotics were able to prevent loss of sight. The case which we have just read shows that in the future we shall be better armed, and that eyes may be saved by section of the ciliary plexus.

SYDNEY STEPHENSON.

FAMILIAL PIGMENTARY CHORIO-RETINITIS.*

BY

DR. LOUIS DOR.

LYONS, FRANCE.

In addition to the classical pigmentary retinitis, other diseases are known which differ from the ordinary form in certain important respects. I have just had under observation a family in which four out of eight children were affected with a special form of pigmentary chorio-retinitis.

In these the affection began at the age of 30 years. It was characterized at the commencement by hemeralopia with spidery pigmentary lesions. Then appeared round choroidal *plaques* scattered all over. This was followed by the appearance of white fibrous lines outlined in the retina as if by strokes of a brush. Adhesions of the iris to the lens were the next signs, and, lastly, cataract and almost complete blindness towards 50 years of age. The process was not

* From *La Clinique Ophtalmologique*, 10 février, 1910.

modified either by mercury or salicylate. The patients are all of normal constitution and have no defect such as to suggest syphilis or late hereditary tubercle. But, on the other hand, we are not here dealing with typical pigmentary retinitis.

The fact which shows this is that the affection is not found in the ascendants of the patients. I have tabulated the genealogy of the family in question which I call B.P. B. is the name of the father, and P. that of the mother before marriage.

The ascendants of the family B.P., namely, parents, grand-parents, uncles, aunts, grand-uncles and grand-aunts, comprise thirteen persons of the first and fourteen of the second generation. In this total of twenty-seven individuals there has been no case of hemeralopia. Then suddenly four children out of eight become affected with this symptom and with retinal and choroidal lesions discovered by the ophthalmoscope.

My first idea was that there had been a consanguineous marriage, but there had been nothing of the sort. I made enquiry concerning the possibility of syphilis, tubercle, and malaria in mother or father, but I found nothing to justify the hypothesis that any of them had existed.

My questions brought to light one curious fact, namely, that there had been heart disease and sudden deaths in both families. The union of these families, then, has resulted in defective products, and has caused, all at once, a new infirmity which did not exist in either family. One must suppose that if the father had married another woman, and if the mother had espoused another man, the children would not have been defective. That, at any rate, is what one sees in regard to congenital cataract in certain families where there are two successive marriages. But in the present case the appearance of the disease at the age of 30 years could hardly have served as a warning to the parents to moderate their procreative zeal, or have led them to divorce and subsequent re-marriage.

It would be most important to know if this acquired affection will be transmitted hereditarily. None of the children are affected up to now. (The children of the various patients given in the table are at present aged 18, 15, 14, 10, and 7½ years. Two in one childship were still-born.—E. T.)

The hypothesis invoked by the family to explain these four cases of chorio-retinitis is that this affection was caused by dampness of a house built in 1880, to which went the father, mother, and five of the children aged then 18, 16, 14, 10, and 4 years; two children, aged 9 and 7 years, were boarded with uncles or aunts. The eighth and last child was not yet born; it was born after the family had occupied the house for three years, during which time the house had had time to dry. Now, those who became hemeralopic are just the children Nos. 1, 2, 3, and 7; No. 4 died on military service at 24 years; but Nos. 5 and 6, who never lived in the house in question, and child No 8, who was born later, all have good sight.

It is evident that dampness of itself cannot be a factor in chorio-retinitis; but it is possible that in the walls and woodwork and even in the food certain micro-organisms might develop and be introduced *viâ* the alimentary canal and might finally determine ocular troubles. The hypothesis is not an absurd one.

ERNEST THOMSON.

REVIEW.

THE NEWER OPERATIONS FOR GLAUCOMA

BY

ARTHUR J. BALLANTYNE, M.D.

SURGEON TO THE GLASGOW EYE INFIRMARY.

THERE are few more interesting chapters in the recent literature of ophthalmology than those which record the efforts of surgeons to devise an operation that will be both easy of performance and devoid of serious risk, and will at the same time offer reasonable prospects of improvement or cure in chronic glaucoma.

Since its introduction by von Graefe, half a century ago, iridectomy has held the field practically undisputed, and any attempt to displace it from its position of security was at first looked at askance. It is admitted on all hands that the results of iridectomy in acute glaucoma leave little to be desired. In chronic congestive or inflammatory glaucoma its beneficial effects have been scarcely less notable, but it is almost universally recognised that in chronic simple glaucoma iridectomy has not been by any means so successful as in the other forms of the disease. A growing dissatisfaction with the relative futility of iridectomy in this condition has led to the introduction, from time to time, of alternative operations, but although each has had its body of supporters, none has yet been received as the last word in the surgical treatment of chronic glaucoma.

Whatever may be the true pathogenesis of the condition, the working hypothesis on which all efforts at treatment are based is that there exists some abnormal relationship between the intra-ocular pressure, on the one hand, and the resistance of the ocular tunics, on the other. We are compelled therefore to seek means whereby the tension of the eye may be permanently reduced by facilitating the outflow of the intra-ocular fluids. The authors of the newer glaucoma operations claim that they do establish this permanent reduction of the ocular tension, and if their claim is found to be justified, these operations will mark a distinct and valuable advance in ophthalmic surgery.

Readers of THE OPHTHALMOSCOPE have been kept in touch with the literature of this subject, through its abstracts, reviews, and original articles, which, however, are now distributed over a period of four years. The present Review, undertaken in view of the expected discussion at the forthcoming Oxford Ophthalmological Congress, is presented in the hope that it may give the reader some idea of the chief points round which discussion may be expected to centre. It will be convenient in the first place, at the risk of repeating what has already been published here and elsewhere, to classify and briefly to describe the operations which we are to consider. Thereafter we may ask and attempt to find an answer to some questions bearing upon their utility and safety.

Sclerotomies.

The writings of Lagrange, Herbert, and their followers, have made us familiar with the conception of the "filtering cicatrix," but lest we should imagine that the idea originated with these writers, it is well to recall the fact that von Graefe, de Wecker, and others were quite familiar with the idea of the filtering cicatrix. It was, indeed, de Wecker who coined the phrase. In

the discussions which centred round the *modus operandi* of iridectomy in glaucoma, de Wecker held that to explain the apparent success of iridectomy where the iris was atrophic one was forced to conclude that the effect depended on the scleral incision, which was followed by a "*cicatrice à filtration*." When it came to be suspected that in chronic simple glaucoma iridectomy was useless or even harmful, de Wecker felt that an alternative operation was desirable, and in 1867 proposed sclerotomy, the cicatrix of which facilitated the filtration of aqueous, and consequently secured a permanent reduction of intra-ocular pressure. Not only did de Wecker aim at the production of a filtering scar, but he also insisted that the sclerotomy wound must be free from incarceration of iris.[1]

Since its introduction, sclerotomy, in some form, has, next to iridectomy itself, been the operation most largely practised in simple chronic glaucoma. It has been accepted as a safe procedure, although repetition of the operation on the same eye is frequently required, owing to the want of permanence of the results. Dianoux[2] has recently reaffirmed its value, but recommends that it be followed up by massage of the eye, to prevent first intention healing, and to cause the formation of a permeable cicatrix. He is supported by Wicherkiewicz[3], who recommends the same measure after iridectomy.

The operation of sclerotomy has assumed many forms in the hands of different operators. The two classical methods are those of de Wecker and Quaglino, the former being probably the more popular.

If one may judge by the absence of any expression of disapproval of the newer operations from the supporters of sclerotomy, one is led to the conclusion that in chronic glaucoma sclerotomy, after forty years, has, like iridectomy, failed to give the satisfaction that it seemed to promise. But the belief that it *ought* to be possible to produce deliberately a corneo-scleral wound which will lead to a permanently filtering cicatrix, has never been altogether lost, and was the motive which inspired the newer operations, which will be considered under the heading of sclerectomies.

In addition to the classical sclerotomies of de Wecker and others, one or two more recent forms may be alluded to.

Querenghi's operation of sclero-choriotomy[4, 5] consists in paracentesis of the posterior chamber with a perfectly linear Graefe knife, making puncture and counter-puncture immediately behind the insertion of the iris. The author believes that glaucoma is due to a hydropsia of the perichoroidal space, and that his operation overcomes this by establishing a communication between the perichoroidal space and the aqueous chambers.

Bjerrum's operation[6] is recommended for simple glaucoma if myotics fail. With a narrow Graefe knife he makes an incision, the puncture and counter-puncture being placed at the limbus and the knife being made to cut out obliquely, so that it emerges through the sclera from 3 mm. to 6 mm. from the upper or lower edge of the cornea. The incision is rendered subconjunctival by making the conjunctival puncture and counter-puncture some distance from the limbus.

Among the sclerotomies should also be included the procedure tried by more than one operator in the past, and recently revived by Herbert[7], namely, the infolding of a slip of conjunctiva between the lips of a corneo-scleral wound, with a view to the establishment of a filtering cicatrix.

Still another form of sclerotomy is the *subconjunctival paracentesis* operation introduced by Herbert two years ago.[8] Having subconjunctivally passed a narrow Graefe knife into the anterior chamber, in such a way that it makes a short incision parallel to the corneal margin, and 1 mm. from it, he carries the knife from each end of this incision a short distance inwards towards the

cornea. In this way he isolates a rectangular tongue of sclero-corneal tissue, the partial shrinkage and displacement of which are said to lead to the formation of a filtering cicatrix. More recently[9] he has been making a broader tongue, placing it at the upper limbus, and combining it, in some cases, with an iridectomy.

Abadie's Operation.—In an article which appeared in the *Archives d'Ophtalmologie* for May, 1910, and a translation of which will be found in the present number of "THE OPHTHALMOSCOPE" (p. 501), Abadie describes the new operation of "Ciliarotomy"

Abadie has always disputed the claims of Legrange, chiefly on theoretical grounds. He holds that filtration through the cicatrix is not the cause of the reduction of tension after iridectomy or sclerectomy, that a very small iridectomy is as efficacious as a large one, and that the effect is really attributable to division of the nervous circle of the iris.

Believing that in certain cases glaucoma is due to irritation of the nerve plexus in the ciliary zone, he hopes to produce an "anti-glaucomatous" action in such cases by division of the nervous circle. This he does by first dissecting up the conjunctiva and then with aRichter's triangular knife making a 7 mm.-8 mm. incision through the ocular tunics in a meridional direction immediately behind the root of the iris. The conjunctiva is sutured in place over the wound.

The operation has given Abadie excellent results in relief of pain, reduction of tension, and improvement of vision, in cases of absolute glaucoma and glaucomatous degeneration.

Cyclodialysis.

Heine, of Breslau, introduced this operation to the Opthalmological Congress at Heidelberg in 1905.[10] With a straight lance knife he makes an incision in the sclera parallel to the corneal margin and 5 mm. or 6 mm. outside of it. A small spatula is then passed through the wound and between the sclera and uveal tract into the anterior chamber, breaking through the ligamentum pectinatum.

The operation is based largely on the suggestion of Axenfeld, that the choroidal detachment which Fuchs had observed after operation for cataract, occurred also in glaucoma iridectomies, and was responsible for the good results of these operations. Heine believed it possible to set up, by means of his operation, a communication between the anterior chamber and the supra-choroidal space.

The abundance of references to this operation in the literature of the last last few years [11, 12, 13, 14, 15, 16] shows that it has excited a good deal of attention. Opinions vary considerably as to the safety and trustworthiness of the operation as a means of relieving pain and tension, and as to the permanence of its results. The interest manifested in Heine's operation has no doubt been somewhat lessened by the advent of the "filtering cicatrix" operation, but cyclodialysis has again appeared as an integral part of Fergus's sclerectomy with the trephine, to be referred to at a later stage.

Operations involving incarceration of the iris in the wound.

The operations comprised in this group resemble the most recent procedures of Lagrange and his followers in their aim of ultimately establishing a permanently permeable cicatrix, but the former differ from the latter in that they seek to attain their object by means which are deliberately avoided by the advocates of the iris-free filtering scar.

The authors of the incarceration operations base their proposals on the following three facts:—(1) that in such an operation as extraction of cataract the entanglement of iris in the wound frequently leads to the formation of a cystoid, or, at least, a fistulous, scar, and that the eye in consequence remains permanently soft, with evidence of leakage of aqueous fluid into the subconjunctival tissue; (2) that in iridectomies done for acute glaucoma the best and most permanent results are found in cases where the iris has become entangled between the lips of the wound; and (3) that the risk of infection of a prolapsed or incarcerated iris is greatly less in the cases where the latter is covered with conjunctiva. If the beneficial effect of iridectomy in many cases is due, not to the iridectomy but to an accidental inclusion of iris, why not, they ask, set out to produce such an inclusion in a regulated and deliberate manner, adding the conjunctival covering to avoid risk of infection?

In June, 1903, Major H. Herbert[17] communicated the results of no fewer than 130 operations for the production of a *subconjunctival prolapse of the iris* in primary glaucoma. In thirteen the iris was left uncut, in five an iridotomy was added, and in all the others iridectomy was performed. He found that the relief of tension was certain and permanent, although in some cases the reduction was not immediate but was established only after the use of massage and myotics for periods up to two or three months. The effect on vision was found to be more favourable than could be looked for in the same class of cases from iridectomy, and this was most notable in cases with advanced failure of vision, for in early simple glaucoma the post-operative astigmatism was apt to disturb the good central vision. He also held that the risk of late infection was very small, and that early serious complications were less frequent than in similar cases operated on by large iridectomies. In 1908, Herbert[17] was still convinced of the value and safety of the operation.

In the *Annales d'Oculistique* for 1907, Holth[18] advocated a somewhat similar procedure. He varies his operation somewhat in regard to the form and position of the incision, and the method of producing the incarceration; but in most cases he makes either a flap incision at the limbus, with a linear knife, covering it with a conjunctival flap, or a 6 mm. incision 1 mm. outside the corneal border with a keratome, which is first made to pierce the conjunctiva 8 mm. to 10 mm. from the limbus, so as to render the corneo-scleral wound subconjunctival. An iridectomy or iridotomy is done before the iris is drawn into the wound. Holth reported that he had done the operation 41 times, in 85 per cent. of which he had obtained persistent conjunctival œdema with normal tension. In a later paper[19] he published the results of a further series of 87 operations with 86 per cent. of filtering cicatrices. He had had no bad results and had not lost an eye. Some of the cases were found still satisfactory on subsequent examinations six months to two years later; but the author seems to have felt that the results were a little uncertain, and he turned his attention later to the production of a filtering cicatrix by means of sclerectomy. Borthen[20] has done fifty operations for establishing a subconjunctival prolapse without previous iridectomy. In no case of simple or absolute glaucoma did he fail to obtain the desired results. Maher, in the discussion following a contribution by Lawson[21], stated that he had performed a similar operation combined with iridectomy, and in ten or twelve years had lost only one eye from iridocyclitis. He thought the benefits outweighed the risks of inflammation or of sympathetic disease.

The fear of disaster from infection of the eye, or from sympathetic ophthalmitis of the fellow eye in these operations which we have just been

considering, and the difficulty of regulating the effect produced, supply two good reasons why we should carefully weigh the claim made on behalf of the next group of operations, some of which are stated to be free from both of these drawbacks

Sclerectomies.

Quite a number of these operations are now on trial, but first in point of time come those of Lagrange and Herbert.

Lagrange's Operation.—In May, 1906, Lagrange brought forward his operation, the details of which have been made familiar through a now fairly large number of papers from the pen of Lagrange and others (bibliography 22 to 38). He is of the opinion that in iridectomy the removal of iris *per se* is not answerable for the success of the operation. He says that in operations for glaucoma, hypertension interferes with the co-aptation of the wound. The cicatrix allows a certain amount of filtration, and this phenomenon explains the success of the iridectomy. In chronic glaucoma with low tension operation is valueless because the wound does not give place to a filtering cicatrix. The conditions are strictly comparable to those in the normal eye, in which no form of scleral incision is able to produce a permeable scar (Schoeler[39]). Again, he recognises that a filtering cicatrix can be produced by sclerotomy and in iridectomy, if the iris is involved in the wound, but he sets out to produce an "iris-free filtering cicatrix" and this he claims to have succeeded in accomplishing. His operation he now calls that of "Sclerecto-iridectomy," the sclerectomy being the essential part of the operation, the iridectomy only conditional.

The accompanying diagrams (figures 1 to 4) will help to explain the steps of the operation. Using a narrow Graefe knife, a small corneo-scleral flap is made at the upper part. Puncture and counter-puncture are made 1 mm. outside the corneal margin, and the blade is carried

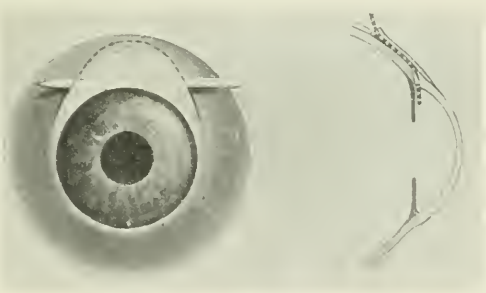


FIG. 1.—Section of the Sclera and Conjunctiva.

upwards parallel to the iris and as close to it as possible, the first object being to sever the scleral insertion of the ciliary muscle. The plane of the knife blade is then changed, so that it emerges from the sclera 2 mm. or 3 mm. from the limbus and thus bevels the posterior lip of the incision. The incision is completed with a large conjunctival flap (Fig. 1). This flap having been turned down, the corneal lip of the wound is removed

by the scissors (Fig. 2). If iridectomy is considered desirable, it is done at this stage (Fig. 3), and the replacement of the conjunctival flap completes the operation. Iridectomy, although done in all the earlier operations, is not

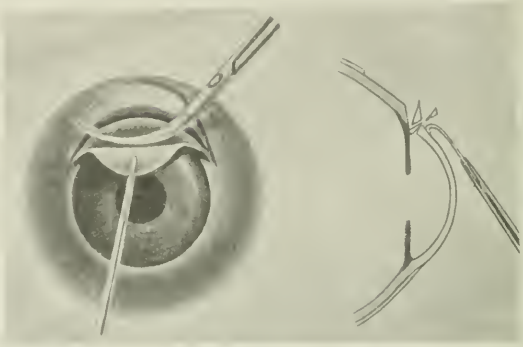


Fig. 2. Resection of the Sclerotic.

considered essential. It should always be done where for any reason, such as hypertension, prolapse is feared. No iris must be left between the lips of the wound. The result of the operation is shown in Fig. 4.

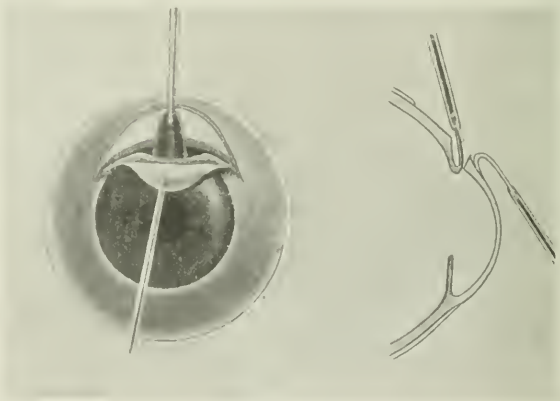


Fig. 3. The Making of the Iridectomy.

From his extensive experience of the operation, Lagrange has reached the following conclusions.—The results of sclerectomy vary according to the degree of hypertension of the eye operated on. Three varieties of cicatrix are distinguishable according to the amount of sclera excised: (1) that in which there is mere thinning of the sclera owing to the excised portion not reaching the posterior surface of the cornea (conjunctiva smoothly covers the cicatrix); (2) that represented by a subconjunctival fistulette, due to

excision of the whole thickness of the sclera, in an eye with moderate tension (the conjunctiva lies smoothly over the cicatrix); (3) the fistulous cicatrix with an ampulliform elevation of the overlying

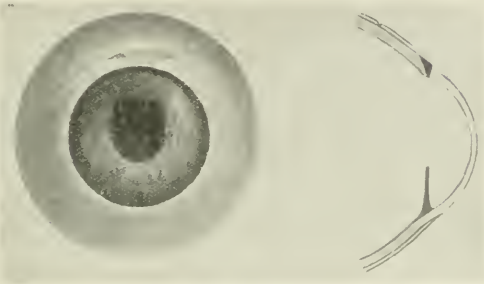


FIG. 4.—The Result of the Operation.

conjunctiva, resulting from excision of the whole thickness of the sclera in an eye the seat of high tension. In cases of high tension, even a simple sclerotomy will allow ample filtration, owing to the gaping of the wound, while in cases without elevation of the tension, sclerotomy will be quite ineffectual. He therefore proposes the following rules of procedure.—(*a*) If tension is normal to +1 do sclerectomy without iridectomy, the amount of sclera excised being inversely proportional to the degree of hypertension. (*b*) If tension is +1 to +3 do sclerecto-iridectomy, the iridectomy being added to avoid entanglement of the iris. He does not recommend his operation for acute glaucoma. It is especially adapted for cases of chronic simple glaucoma.

Herbert's Operation.—Next in point of time comes Major H. Herbert's[40] operation of "wedge-isolation."

In the argument which precedes his description of the operation he speaks of permeable cicatrices as belonging to three groups, the cystoid, the fistulous, and the filtering. By the filtering as opposed to the fistulous cicatrix he appears to mean a cicatrix in which only microscopic channels exist to allow the percolation of fluid. While Lagrange started from the observations that in an eye the seat of high tension, sclerotomy is succeeded by a gaping wound which allows of permanent filtration, and that no kind of scleral incision can permit permanent filtration in an eye with normal tension, Herbert takes as his starting-point the clinical fact that cataract extractions with a large conjunctival flap return after long periods, with a more or less gaping wound, and œdema of the overlying subconjunctival tissue from filtration of aqueous. This he takes as his type of *filtering* cicatrix, and he describes it as "the condition which has been long desired, but never attained with any approach to regularity in the treatment of glaucoma." From such observations he argues that the iris-free filtering cicatrix is a practical entity, and he aims at its production in glaucoma.

Herbert's first device to secure delayed union and consequent filtration was his "jagged incision" operation—a form of sclerotomy—dating from April, 1906. In this operation he made one or both lips of a small corneo-scleral incision as jagged and uneven as possible by means of sawing movements of the narrow Graefe knife. With an experience of sixty cases, he obtained results which were excellent, on the whole, but somewhat uncertain. He also

used the operation of Lagrange, both in its original form and combined with the jagged incision, but he soon abandoned these procedures in favour of his "wedge-isolation" operation, first carried out in December, 1906. In this operation the intention is to cut out a wedge-, or rather a prism-shaped piece of corneo-sclera, the long axis of which shall be tangential to the corneal margin, its base attached to the under surface of the conjunctiva and its edge towards the posterior surface of the cornea. The isolated wedge is raised a little from its bed by the escaping fluid, and as it has now to depend for its nutrition on the conjunctiva to which it is attached, it shrinks sufficiently to provide for filtration from the anterior chamber to the subconjunctival tissue, but not enough to cause an actual fistula. The operation is claimed to permit of the establishment of different degrees of filtration; it is safe; and if it fail to produce the desired result, it does not prejudice the subsequent performance of the usual operations.

It is difficult to follow this operation from verbal description alone, but perhaps the following summary of the steps, with the assistance of the accompanying diagrams, may make it more or less clear.—A very narrow Graefe knife is used. (1) Proceeding as if the intention were to make a shallow corneo-scleral flap, puncture and counter-puncture are made close to

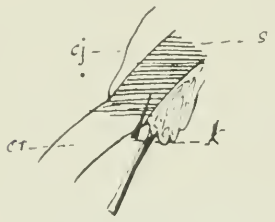


FIG. 5.—Position of the knife blade in making the first incision.

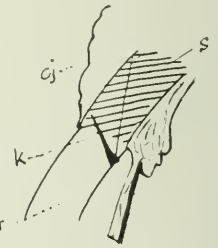


FIG. 6.—Position of the knife blade in making the second incision. The thin line shows the position of the first incision, which has been partly made.

the margin of the cornea, the knife point having previously passed through the conjunctiva a little distance above the point of entrance. The upward cut is made with the knife blade bevelled a little backwards, and at this stage the bridge of sclera is left undivided (Fig 5). (2) The knife is brought down again and its edge turned forward. A forward cut is made perpendicular to the scleral surface, care being taken not to cut through the conjunctiva (Fig. 6.) This incision makes the lower boundary of the wedge of tissue. (3) The knife is drawn backwards, and rotated upwards to lie in the original incision, which is continued upwards until the knife edge emerges through the sclera, a millimetre or so form the corneal margin. This completes the isolation of the wedge. The blade of the knife is now turned upwards and backwards to form a long conjunctival flap, which however is left attached at its upper extremity. A small basal iridectomy is advisable in order to prevent prolapse.

The widespread interest which these operations have excited has led other operators to introduce modifications, which, while carrying out the ideas of Lagrange, might be simpler of performance and freer from risk than his operation. The first of these modifications was proposed by Holth.[19]

Sclerectomy with punch-forceps.—This operation dates from May, 1909, and it will be found fully abstracted and illustrated in THE OPHTHALMOSCOPE

of November, 1909 (p. 774). The first step of the operation, the formation of a corneo-scleral flap, may be carried out either by a Graefe knife or with the keratome. In the former case the conjunctival flap is cut in completing the section, in the latter the keratome is made to enter the conjunctiva some distance above the scleral puncture. Iridectomy follows, and then the anterior lip of the wound is partly cut away by means of punch-forceps, which are a modification of Vacher's (Fig. 13) or de Lapersonne's irido-capsulectomy punch-forceps.

Brooksbank James's operation.—In the discussion on Lawson's contribution[21] Brooksbank James referred to a modification of the Lagrange operation practised by him in six cases. A description of his method has more recently appeared in the *Transactions of the Ophthalmological Society* (Vol. XXX, Fasc. 1, 1910). He dissects down a flap of conjunctiva, and then with a Beer's knife, makes an incision into the anterior chamber from without inwards, 1 mm. from the limbus. After an iridectomy, a portion of sclera from the lip of the wound is removed by scissors or punch-forceps, preferably the latter.

Sclerectomy with the Trephine.—The latest additions to the list are the two operations in which the trephine is used to remove a segment of the corneo-sclera. These are the operations respectively of Fergus and of Elliot. Both of these operations are based on that of Lagrange, and as the reader may gather from the Review on the Use of the Trephine, published by Sydney Stephenson in THE OPHTHALMOSCOPE for February, 1910, they have a much closer affinity to Lagrange's operation than to the older operations of Argyll Robertson, Fröhlich, &c., in which the trephine was formerly employed.

Fergus's Operation.—Fergus has employed this operation since January, 1909, and he demonstrated it before the Ophthalmological Congress at Oxford and the Ophthalmological Section of the British Medical Association at Belfast in July of the same year. The only published account of it was contained in an abstract of the latter contribution in the *British Medical Journal*[41] until the author took occasion to describe the genesis and the nature of the operation in THE OPHTHALMOSCOPE of February, 1910[42].

The *technique* of the operation is simple.—A conjunctival flap is dissected up towards the cornea and laid over the corneal surface, while with the trephine (Bowman's), a small disc of sclera is removed a millimetre or two from the apparent corneal margin. At first the operation was completed at this stage by replacing the conjunctival flap, but Fergus soon introduced a modification which now forms an essential part of his operation, namely, the passage of an iris repositor from the trephine hole into the anterior chamber, keeping it in close contact with the sclera and cornea. The conjunctiva is then replaced, and stitched in position.

Elliot's Operation.—About the time that the above operation was on trial, Major Elliot, in Bombay, had, apparently independently, conceived the idea of utilizing the trephine in a similar way. He first used the trephine in August, 1909, and by the time of his first communication,[43] he had operated on 50 eyes.

Elliot also raises by dissection a flap of conjunctiva with its base at the corneal margin. His trephine opening is made as far forward as possible, so as to enter the angle of the anterior chamber. The disc of sclero-cornea is removed, iridectomy is done, if necessary to prevent incarceration in the wound, and the conjunctiva replaced. It is unnecessary to describe the operation in any greater detail, as it will be found fully discussed in the article by Elliot himself, which appears in the present issue of THE OPHTHALMOSCOPE (p. 482). Elliot found that in his first 50 cases tension was relieved in every one. While these two operations have features in common, it is obvious, as stated by Sydney Stephenson (*loc. cit.*), that they have marked points of difference. Elliot's operation is as nearly as possible

the operation of Lagrange, making allowance for the use of the trephine instead of the scissors, since the opening forms a communication between the angle of the anterior chamber and the subconjunctival tissue, this object being attained by keeping the trephine as far forward as possible. The iridectomy is added, not as an integral part of the operation, but merely to avoid the risks of prolapse.

Fergus's operation, on the other hand, involves an opening up of the suprachoroidal space, to which is added a cyclodialysis. It is true that Lagrange, in stating the aims of his operation, speaks of cutting through the scleral attachment of the ciliary muscle and opening up a communication between the anterior chamber and the suprachoroidal space, but the successful accomplishment of this incision must be difficult, and it may be shown in the future that in most cases the incision is purely into the anterior chamber. In any case Lagrange in his later papers seems to lay most of the emphasis on the formation of a fistulous track between the anterior chamber and the subconjunctival tissue-spaces. Fergus's operation, therefore, would seem to have a nearer relation to the cyclodialysis of Heine, substituting a trephine opening for a scleral incision with the keratome.

FIG. 7.—Sclerectome, ready for use.

FIG. 8.—Sclerectome with inner rod removed to show construction of instrument.

Verhoeff's Operation.—Verhoeff's contribution to the subject[14] is the substitution of a special instrument—the "sclerectome"—for the trephine. As its inventor says: "it combines the actions of a punch and a trephine."

An incision 2-3 mm. long having been made parallel with, and about half a millimetre from the corneal margin (Fig 9), the instrument is passed through the wound, and having been carried to one end of the incision (Fig. 10)

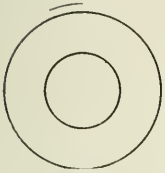


Fig. 9. Position of incision. Conjunctival flap not shown.

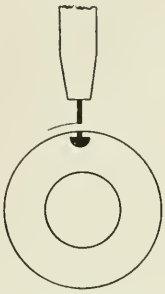


Fig. 10.—Sclerectome in position ready to cut.

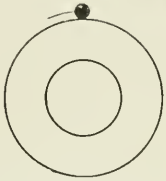


Fig. 11. Fistula completed. Button-hole in iris not shown.

it is made to cut out a small clean round hole (Fig 10), the diameter of which is one millimetre. A small buttonhole is made in the iris. The operation, like the others, is carried out under a conjunctival flap.

Bettremieux's Operation.—This operation appeared in 1907[46] under the title of "simple anterior sclerectomy." The author sets out from a different standpoint from that of the other operators. He states[47] that he has been impressed by the following facts: (1) that glaucoma has been caused experimentally by the cautery applied round the cornea, or by tying the anterior vessels, or, accidentally, by burns at the corneo-scleral junction, *i.e.*, by conditions which block the intraocular blood circulation, (2) that Exner explains the action of iridectomy in glaucoma on the ground that the arteries and veins in the iris are made to communicate directly with each other, and that this restores the normal circulatory conditions. Taking this as his basis, he operates as follows.—The sclerotic having been exposed, with a needle slightly curved at its end he traverses tangentially to the corneal margin, the outer layers of the sclera, which he then excises with a thin and narrow Graefe knife. This produces what he calls a "filtering zone," but later he lays all the emphasis on the setting up of an anastomosis between the deep scleral and more superfical subconjunctival vessels, which restores the normal *blood* circulation of the eye. If Bettremieux's own conception of the operation be the correct one, it probably ought not to be included in the group of operations aiming at the production of a filtering cicatrix.

Lagrange, in speaking of his own operation, warns the reader against confusing it with the simple anterior sclerectomy of Bettremieux, by which, he declares, a filtering scar cannot be produced.

Remarks.

Having thus briefly considered each of the newer operations, we are now in a position to ask, and, if possible, to answer some questions which must, sooner or later, be satisfactorily disposed of if these operations are to attain to a permanent place in ophthalmic surgery.

We have first to put to ourselves the question, "Is there such a thing as a filtering cicatrix?"

It is usually admitted that the cystoid scar which occurs after a certain number of cataract extractions and glaucoma iridectomies, is evidence of a permanent fistulisation of the eye, and it has been repeatedly acknowledged by experienced surgeons that the most successful glaucoma iridectomies are often those in which iris has become entangled in the wound. No one proposes to attempt to form a cystoid cicatrix in its extreme form, but Holth's iridencleisis and Herbert's subconjunctival prolapse aim at the inclusion of iris in the wound, and we may take it that the claim of these operators to set up permanent drainage of the anterior chamber is fairly well established, the opposition to their operations being based on their alleged dangers and the difficulty of regulating the amount of the effect produced.

That filtration of fluid occurs through a simple, iris-free, corneo-scleral wound before cicatrisation is complete is hardly questioned, and it is not denied that for a limited period after healing is apparently complete, the cicatrix may be in some degree permeable. Moreover, one would have thought from a perusal of the papers of de Wecker and Lagrange, and their followers, that it might be accepted as an axiom, that the *possibility* of a permanently filtering cicatrix was an established fact. All of them have agreed in assuming that the filtering cicatrix occurred accidentally, and that it was but natural to aim at the deliberate production of a condition which was believed to be beneficial in certain cases. At this very point, however, the filtering cicatrix operations are met by the opposition of Thomson Henderson[18], who denies the *possibility* of a permanent filtering cicatrix. It cannot be said, however, that he has substantiated the truth of his opinion. It is proverbially difficult to prove a negative, and we now have to set against such statements of what *can* happen, the statements of others as to what *has* happened.

We have already seen that Herbert devised his operation in the belief that the filtering scar is a "practical entity," basing his belief on the observation of filtering cicatrices accidentally produced in the extraction of cataract (compare Elliot's third case quoted below). This belief he continues to uphold, and as clinical evidence of the existence of filtration, he submits these two points: (1) that there is true œdema over the scar, evidenced by pitting on pressure with a probe, and an unusually translucent appearance of the conjunctiva; and (2) that this œdema is increased by pressure on the globe, or if not already in evidence, is produced by the same method. He is equally convinced[19] of the possibility of producing a permanent filtering cicatrix by his operation of modified subconjunctival paracentesis. Five out of six cases which he was able to observe at periods up to two years after the operation, gave reduced tension and filtering cicatrices.

Elliot[13] expresses himself as quite convinced of the reality of the permanently filtering iris-free cicatrix. The cases on which he bases his opinion include one seen twelve weeks after the Lagrange operation, one three-and-a-half years after iridectomy, another seven-and-a-half years after iridectomy, and, lastly, one ten years after a combined extraction of cataract. In all of them the existence of filtration through the cicatrix was proved by the presence of œdema as described by Herbert (*vide supra*).

Verhoeff[11] says it is certain that it is possible to establish permanent drainage by this means.

All the doubts cast on the reality of the filtering cicatrix as a result of the sclerectomies of Lagrange, Herbert, and others, will apply with double force to the simpler operation of sclerotomy, as practised by de Wecker and his successors with the same end in view. In this case the opponents would

have the support of Schoeler,[39] who satisfied himself by animal experiments that no kind of scleral section can produce permanent filtration, and what applies to the normal eye will apply equally to the case of chronic simple glaucoma with normal tension. de Wecker himself recognised the fact that in chronic simple glaucoma the cicatrix consolidates and the effect diminishes, hence the repetition of sclerotomy, so often advised to prolong its effect, and the employment of massage of the eyeball, as an adjuvant to delay the unavoidable closure of the filtration channels. Lagrange, while holding that the good results of iridectomy in glaucoma with elevated tension were due to the sclerectomy rather than to the iridectomy, saw that the case of chronic simple glaucoma without tension was simply that of the normal eye, and it was this very fact that led him to devise his sclerectomy operation in the hope of producing a gap which could be permanently occupied, not by an increasingly dense tissue, but by a more or less fistulous cicatrix.

So much for the clinical evidence for the existence as a recognisable entity of the filtering cicatrix. We may take it that from the clinical point of view this evidence is almost, if not quite, conclusive, and meanwhile we may accept as a sign of the presence of filtration, the conjunctival oedema as described by Herbert and Elliot.

Fig. 12.

Let us now turn to the histological aspect of the question. The clinical results are the ultimate standard by which these operations will be judged; but having claimed to produce a filtering cicatrix, it lies with the authors to prove that such a thing exists. One imagines that it will be confessed, even by the advocates of the filtering cicatrix operations, that the histological evidence in their favour is still somewhat scanty and unsatisfactory, nor is this surprising, considering the short period during which the operations have been on trial.

Lagrange, in one of his earlier papers,[28] speaks of his hope of examining

microscopically eyes operated on by his method and the eyes of dogs submitted to his operation, but so far very little of this material is available for our purpose.

Demicheri[28] had occasion to examine an eye enucleated fourteen days after the Lagrange operation on a subject with hæmorrhagic glaucoma. He found between the lips of the wound, from within outwards, a small knot of atrophied iris, a mass of cellular tissue, and a quantity of loose vascular œdematous tissue containing cystic cavities and numerous pigmented cells apparently washed into it from the iris by a stream of fluid. From his examination of the wound he felt sure that there had been a true filtration of fluid through it from the anterior chamber to the subconjunctival connective tissue. He found no trace of communication between the anterior chamber and the supra-choroidal space. At the extremities of the incision there was incarceration of the iris. He inclines to think that a true scleral fistula, as conceived by Lagrange, does not persist for long, and that the tissue may ultimately become so dense as to put a stop to all filtration. Lagrange[29] disowns Demicheri's case on two grounds: that it is not an example of his operation if iris is entangled in the wound, and that he does not perform his operation in acute glaucoma. Early in last year Lagrange[31] made an important contribution to the histological aspect of sclerectomy by publishing illustrations of sections from the eye of a dog submitted to his operation eleven months earlier (Fig. 12). During the eleven months the eye had remained quiet and with normal tension. Microscopic examination showed beneath the conjunctiva larger and smaller cavities communicating with each other and with the anterior chamber. Further, the anterior chamber could be seen to communicate also with the supra-choroidal space. The walls of the spaces were neither thickened nor covered with epithelium.

Weekers and Heuvelmans[32] claim to have established the truth of Lagrange's statement, that such a fistula can be produced, by their microscopic examination of the eyes of a rabbit operated on five months before according to the method of Lagrange.

Holth[19] accompanied his description of his operation of sclerectomy with punch-forceps, with a photomicrograph of the wound six weeks after the operation (Fig. 14). It shows fistulisation. This case had presented normal tension, and marked improvement in visual acuity and field.

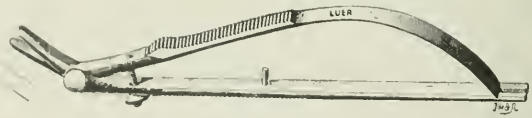


Fig. 13.—Punch-forceps.

I am not aware of any references in the literature to the microscopic examination of eyes after the operations of Herbert, Elliot, Fergus, Verhoeff, or Bettremieux.

The material at our disposal being so scanty, the question that naturally arises as to the nature of the filtering cicatrix and how it acts, cannot yet receive a satisfactory answer. In the communications describing the aims of the various operations and the methods employed to attain them, it will be found that each author has set out with a conception of some kind concerning the conditions that will obtain in the cicatrix after complete consolidation has

been reached. Thus, Lagrange said his aim was to make his incision cut through the scleral attachment of the ciliary muscle, and he believed that it brought the perichoroidal lymph spaces and the chambers of the eye into communication with the subconjunctival cellular tissue. To fulfil this ideal, he aims at making his incision as far back as possible so long as it lies in front of the iris. Morax, in the discussion which followed Lagrange's communication,[27] while acknowledging the good results obtained by the operation, doubted the possibility of producing the exact incision spoken of, namely, the division of the scleral attachment of the ciliary muscle. Given an open angle in the anterior chamber the *possibility* of making the incision described is undeniable, and

FIG. 14.—Sagittal section through the cicatrix of a sclerectomy of the anterior lip with the punch-forceps six weeks after the operation. The patient died from pulmonary embolism following a fracture of the femur.

figure 12 seems to be an example of a successful attempt; but we are probably safe in saying that the great majority of so-called Lagrange operations will comprise a section which gives the root of the iris a fairly wide berth. Lagrange himself has recently seemed to lay more stress on the communication between the anterior chamber and the subconjunctival spaces.

An attempt was also made by Herbert to classify the possible forms of permeable cicatrices into filtering, fistulous, and cystoid. The distinction between the first two was that in the first the channels of communication were many and of microscopic size, while in the second we had a single fistula recognisable as a dark point lying under a "filtration area" of the conjunctiva. Lagrange speaks in one place of the orifice becoming transformed into a tiny fistula, and in another of the attempt to produce a cicatrix with microscopical apertures. In all his communications he makes "fistulisation" the keynote of his operation, but he seems to indicate a cicatrix permeated with microscopic channels. It will be remembered that Demicheri, on the strength of the microscopic examination of an eye after sclerectomy,

doubted the persistence of a true scleral fistula. Weekers and Heuvelmans[1] in speaking of the conditions of success in this operation, say the whole thickness of the sclera must be excised if a permanent fistula is to be obtained; but against this we may put the section from Holth's case, in which only a part of the scleral flap was excised, while filtration was reported to have been present.

Herbert, from the outset, has looked for the formation of a *filtering* scar. He conceives of a shrinkage and displacement of the isolated corneo-scleral wedge sufficient to provide for filtration, but not sufficient to cause a fistula.

In the photomicrograph of Holth's case already referred to (Fig. 14), the gap between the lips of the wound was filled by a loose connective tissue derived from the subconjunctiva, but this perhaps should not be taken as an indication of the ultimate state of the cicatrix, as only six weeks had elapsed since the operation.

Fergus and Elliot put forward no theory as to the nature of the cicatrix produced by their respective operations, and no results of histological examination of eyes submitted to scleral trephining are yet available. Verhoeff apparently looks for the formation of a single fistulous opening as the result of the clean-cut circular wound produced by his instrument. He says it is impossible to produce a filtering cicatrix, but that we can establish a subconjunctival fistula.

Such evidence as we possess, then, regarding the histological characters of the cicatrix points to its persistence as a loosely-built tissue derived from the subconjunctival or other neighbouring tissues, and permeated with fine channels which form a possible path for the aqueous fluid, and, on the whole, we may take it that there is both clinical and histological proof that the filtering cicatrix is a reality.

To come now to the question of permanence, we must wait longer before we can feel assured of the permanence of the filtration. Lagrange's sclerecto-iridectomy is only four years old, Herbert's wedge-isolation operation three and a half years, Bettremieux's about three years, Holth's sclerectomy with the punch-forceps two years, Fergus's eighteen months, Elliot's ten months, and Verhoeff's seven months.

It is not possible to separate clearly the results obtained by most writers into those relating to filtration, to tension, and to vision. We meet too often with vague references to "good results," and similar phrases. We give, without comment, the following figures:

Lagrange, in July, 1907[26], said he had already recorded the results of 27 cases watched for more than six months. Three had no benefit, and four had been lost sight of. Of the twenty good results twelve had improved vision, and in eight vision was maintained. He adds six other cases, in all of which the results were good. In 1908[28] he reported six cases in which sclerectomy had been done without iridectomy. In one the operation was too recent for comment. Four of the others, seen from three to six months after the operation, had maintained improvement in visual acuity and visual field with persistence of filtration. The case operated on by Lagrange at the Ophthalmological Congress at Oxford, in July, 1907, was reported by Doyne[29] six months later with distinct improvement in vision and extent of visual field.

Weeks, in the discussion on Lawson's communication,[21] said he had done Lagrange's operation thirty or forty times, but the anticipation of permanent lowering of tension had not been entirely realised. Rochon-Duvigneaud[33] reports a case in which he obtained a good result. Tension remained *minus*, and the cupping of the disc disappeared.

In July, 1908, Herbert had operated on sixty-three cases, about one-third of which had then been under observation for more than six months. He showed a few cases illustrating the good results following both of his operations. At a recent meeting of the Ophthalmological Society[51] he said he had now the results of six out of eight eyes on which he had done his sub-conjunctival paracentesis in two years. One of the six was a failure from attachment of the iris to the wound. The others all had reduction of tension to normal by filtering cicatrices, but sometimes it took several months for tension to reach the normal level.

For the other operations the following particulars are available.—Bettremieux[52] reports a case of simple chronic glaucoma with poor sight and retention of the outer part of the field only. The patient recovered central vision and still retained it five months later. Holth[19], between June, 1908, and May, 1909, had done his sclerectomy with punch-forceps 30 times. In the first 10 he punched the posterior lip of the wound and the results were not permanent. In the last 20 he removed sclera from the anterior lip and always produced a fistulous cicatrix. There are no specific dates given for subsequent examinations.

No figures are available as to the number of times Fergus's operation has been performed, or with regard to the results.

Elliot's paper[45], printed in this issue of THE OPHTHALMOSCOPE, deals with 128 operations The communication is of interest, not only on account of the large amount of material dealt with, but also because of the detailed manner in which the results are recorded. A special interest attaches to the table giving the most important facts regarding fifteen cases which have been seen again at intervals ranging from one to nine months after the operation. In Elliot's opinion filtration has been maintained in all except one which was doubtful. It will be seen that the tension in practically all the cases was, at the latest examination, lower than before the operation, and slightly higher than immediately after it. It should also be borne in mind that these are tonometer records. Time alone will show whether this position of the tension represents the ultimate condition of the eye, or whether it indicates a tendency to return to the state prior to the operation. Nine months is perhaps too soon to give a definite answer. It is also of interest to note that vision was in many improved, in others stationary, while it was diminished in one case only.

There must be a large amount of material now available on which conclusions might be founded as to the permanence of the results of these operations. Many of the reports are rendered somewhat valueless for our present purpose through absence of necessary particulars. It is much to be desired that operators who have the opportunity to examine cases some time after operation would publish details as to the state of the tension, visual acuity under correction, and field of vision, both before and after operation, as well as particulars as to the appearance of the cicatrix at intervals. Only by the accumulation of such details can the question of the value of these operations be settled.

To refer briefly to the related operations, it may be taken as accepted that filtration of fluid does occur through the scars in which iris is included, and it will be equally freely admitted that a similar scar results from the sub-conjunctival prolapse of Herbert, and the iridencleisis of Holth.

We have seen that Bettremieux does not insist on the filtering nature of the scar in his operation. I am not aware of any histological proof of the existence of the mechanism by which he tries to reduce ocular tension.

There is no microscopical evidence of the justice of Querenghi's claim to set up a communication between the aqueous chambers and the suprachoroidal

space. This idea supplies also the *raison d'être* of Heine's operation of cyclodialysis Doubts have been cast on the permanent existence of the communication between the anterior chamber and the suprachoroidal space by Weekers[15], Krauss[16], and Joudin[13], who have found in microscopic examination of eyes after cyclodialysis, no such communication, but the ciliary body tightly bound down by cicatricial tissue or impacted in the wound.

In the next place we have to ask ourselves whether the amount of the effect produced by the various operations can be regulated. Lagrange and Herbert are the only authors who attempt to answer this question. Lagrange, as we have seen, shortly after introducing his operation, laid down certain rules to guide the operator in the choice of a procedure for eyes under different degrees of tension. Herbert claimed, as one of the advantages of his wedge-isolation operation, that it could be manipulated to allow of more or less filtration. Elliot is still in doubt as to the size of trephine opening which will meet the mean between too large an aperture, with softening of the globe, and too small an opening, with early blockage of the wound.

Lastly, though first in importance, we are faced by the question, do these operations lead to benefit or to cure, especially in chronic simple glaucoma in which iridectomy has failed to give full satisfaction?

A consideration of the results already quoted leaves the impression that the claims of the various authors have all been more or less substantiated, and that a sphere of usefulness, still to be more accurately defined, exists for each of them. There have, indeed, been surprisingly few attempts to deny their beneficial results. Henderson, in disputing the contentions of Lagrange, did not deny the good results obtained by his operation, but held that they were attributable to the accompanying iridectomy. Lagrange did not consider the iridectomy an essential part of his operation, and he took up Henderson's challenge by performing his sclerectomy without iridectomy, The good results of four such operations have already been alluded to. Quite as convincing as this demonstration of Lagrange's was that of Valude,[34] who on one patient performed iridectomy in the better eye and sclerecto-iridectomy on the other. The latter improved as regards tension and vision, while the other retained high tension and failing vision. Sclerectomy was then done on this eye and resulted in improved vision. But while Valude has given his support to the operation of Lagrange, he states that the problem of glaucoma is not solved by establishing a filtering cicatrix. In one case, where an ideal filtering scar had been obtained, vision continued to deteriorate, and he thinks the operation should not be done until the vision begins to fail in spite of myotics.

We have not yet the knowledge which would enable us to gauge the respective merits of these operations. An operation which lends itself to lucid description will naturally be more widely adopted than one the explanation of which is difficult. Herbert's wedge isolation operation has no doubt suffered some neglect on this account. Elliot, who has had the advantage of learning it from Herbert himself, says it is "a tricky and difficult operation."

Simplicity and absence of difficult *technique* will also be factors of great importance in the choice of an operation, other things being equal. The operation of Lagrange presents no difficulty that cannot be overcome with practice, but sclerectomy by the punch-forceps or the trephine is held by many to be a simpler operation. Of the risks of accidents, such as vitreous prolapse, iritis, cyclitis, and sympathetic ophthalmitis, we can only hope to learn by our individual mistakes and misfortunes, or by the experience of others who have the courage to publish all their results, good and bad.

As several of the operations involve interference with the ciliary body, a considerable amount of material must now be accumulating to show whether the traditional fear of wounds in that region is justified.

It cannot be too often insisted on, and we may be allowed to repeat it in conclusion, that the great desideratum now is that every case of glaucoma operated on by one of these newer methods and reobserved on a subsequent date, should be carefully reported with reference to the details already enumerated, and, needless to say, considerable value will attach to any investigations that will throw light on the histological character of the resulting cicatrices.

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CURRENT LITERATURE.

NOTE. Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—FILTRATION IN THE EYE.

(1) Uribe y Troncoso.—The measurement of filtration in the living eye and the true nature of the canal of Schlemm (La filtracion en el ojo vivo, y la naturaleza verdadera del canal de Schlemm.) *Anales de Oftalmologia*, Septiembre, 1909.

(2) Uribe y Troncoso.—The filtration of the living eye and the true nature of the canal of Schlemm. (La filtration dans l'œil vivant et la nature véritable du canal de Schlemm.) *Annales d'Oculistique*, octobre, 1909.

(3) Uribe y Troncoso.—The character of the change in composition of the ocular liquids in the pathogenesis of glaucoma. (Rôle du changement de composition des liquides oculaires dans la pathogénie du glaucome.) *Archives d'Ophtalmologie*, février et mars, 1910.

(1) In the former papers on the subject of ocular filtration, which appeared during 1905 in the *Anales*, Troncoso, of Mexico, pointed out various points which seemed to him fallacious in the investigations of Leber. In any case these measurements were made on dead eyes; we could not, therefore, rely on their results as showing anything like the filtration in the living eye. Troncoso has attempted to solve the problem by examining the living eye. In the rabbit the eye can be dislocated out of the orbit without interfering to any important extent with its physiological function. He separated the conjunctiva from the globe round the cornea, and placed the anterior part of the dislocated eye in a small receiver containing oil, into which the fluids escaping from the eye collected, without mixing with the surrounding medium. Within a few minutes the hæmorrhage from the vessels stopped, and the fluid escaping in big drops from the larger vessels was hardly bloodstained. All round the cornea, also, there appeared small drops of clear fluid from the cut extremities of tiny veinlets

To measure the total quantity of fluid escaping from the eye in a given time, all the drops and clots which adhered to the eye were shaken or detached by rubbing into the oil, and then centrifugalised. Due allowance being made for the clot, the remainder represented the normal filtration. The tables published by Troncoso show a filtration of 5.2 cubic millimetres per minute for the normal eye.

As a result of his observations, he concludes that about half the fluid passes out by means of very small veins, and that the canal of Schlemm contains, in the normal state, not blood but fluid of the same constitution as the aqueous humour. HAROLD GRIMSDALE.

(2) Uribe y Troncoso considers that the measurements of the quantity of fluid which escapes by filtration from a recently dead eye, obtained by himself and Leber with the manometer of the latter, are unreliable, and has therefore endeavoured to collect and measure the whole of the fluid which escapes from

living eyes through the canal of Schlemm. To do this he displaced the eyes of rabbits forwards, fixed them outside the orbit by suturing or clipping the eyelids behind them, dissected the conjunctiva back from the limbus to the equator, and after stopping the hæmorrhage, plunged the eye into a tube containing oil. The muscles were usually separated from their scleral attachments, but in some cases they were left attached without causing any difference in the results. During the experiments fluid could be seen to leave the eyes (1) in comparatively large drops, first of blood, but later of clear fluid, by the large perforating ciliary vessels, and (2) in very fine drops of clear or slightly rose-coloured fluid almost touching each other all round the limbus. At the end of the experiments, which varied in duration from 30 to 65 minutes, the fluids which had escaped from the eyes were separated from the oil by centrifuging, when it was usually found to consist of layers of (1) blood corpuscles, (2) mixed aqueous humour and blood serum, (3) fibrin To ascertain how much of the second layer consisted of blood-serum and how much of aqueous, the proportion of serum to clot was estimated, and an amount proportional to the quantity of clot found in each case was set down as serum, the difference between this and the total amount representing the aqueous. This calculation was performed directly at the time of the experiment in the last three instances, but in the others the mean of the proportions found in four of the animals was assumed for them all.

In all, fifteen experiments were performed, and the results showed that in twelve of these the rate of filtration varied from 8.9 to 3 c.mm. per minute, the mean being 5.2 c.mm., as compared with 7 c.mm. found by Nesmanoff, and with 6 c.mm. found by Leber in his earlier and 5.6 c.mm. and 4 c.mm. in his later experiments. In the remaining experiments two of the eyes were abnormal, and in the third the large perforating veins were cauterised.

The author considers that his experiments shew that there exists a real current in the intra-ocular fluid which continuously renews the contents of the anterior chamber. He also claims that although there is some excretion through the iris, the amount of fluid excreted from the eye may be considered as equal to the amount secreted by the ciliary processes, and that the latter has therefore been established by his experiments

Finally, the author claims that his observation of the excretion of a ring of small drops of clear fluid around the limbus shews that the canal of Schlemm contains under normal conditions not blood but aqueous humour. In the experiment in which excretion by the anterior ciliary veins was prevented by cauterisation, the amount of excretion through the canal of Schlemm was 2.1 c.mm. per minute, or about two-fifths of the mean total filtration.

R. J. COULTER.

(3) **Troncoso** contributes two articles in support of his theory with regard to the important part played by the increase of albuminoid matters in the ocular liquids in the production of glaucoma. The two papers are in reply to the criticisms by Scalinci and Terson of the author's work on the subject, and to the objections raised by the former on the methods adopted by Troncoso in the examination of the aqueous humour in cases of glaucoma and other conditions, namely, interstitial keratitis, irido-choroiditis, etc. They hardly lend themselves to abstraction. BERNARD CRIDLAND.

II.—ACUTE GLAUCOMA IN INTUMESCENT CATARACT.

Frenkel, Henri.—Acute glaucoma in intumescent cataract. (Glaucome aigu dans la cataracte intumescente.) *L'Ophtalmologie Provinciale*, mai, 1910.

Frenkel, of Toulouse, has a communication dealing with acute glaucoma in cases of intumescent cataract, which will repay perusal. Although the association is mentioned in a few text-books, yet the number of individual cases that has been reported is comparatively small. Frenkel epitomises those published by Rheindorf (1882), R. Bylsma (1901), R. Hesse (1907 and 1909), H. Uhlbrich (1907), Elschnig, Isaacs (1908), Warchawski (1909), and Ischreyt (1909), and then passes forward to describe his own case, the details of which follow:

A female, aged 73 years, came for removal of cataract from her left eye, the sight of which had been failing for three years. The vision of the right eye had become affected during the last five months. The direct and consensual reflexes of the left pupil to light were absent, while the pupil was so large as almost to suggest that atropine had been applied to the eye. An incomplete perinuclear cataract was present in the right eye, and in the left there was a mature hard cataract with large nucleous. T.n. No fundus details R.V. 1/50. L.V. fingers at Om. 80. The cataract was extracted by the combined operation from the left eye, and $\frac{1}{3}$ vision was obtained. The patient was seen again some four months after the operation. Her right eye was then in a condition of complete glaucoma, and had been so for a week The pupil was occupied by a saturated white lens, having here a milky and there a nacreous appearance, pushed against the posterior surface of the cornea. The eye was very hard. Vision was reduced to distinguishing the flame of a candle. A couple of months after the commencement of the glaucoma, iridectomy was performed upon the right eye, and eighteen days later the cataract was removed. Pain disappeared, but sight was not restored.

It thus appears that swelling of the lens may provoke an attack of glaucoma in spontaneous cataract just as it may in traumatic cataract. Before this can come about there must be certain predisposing factors, such as advanced age and rapid swelling of the lens. It is possible that a reduction in the dimensions of the circumlental space, errors of refraction, and an increase in the general blood pressure may take a share in the causation of the condition. The iris is pushed towards the sclero-corneal tissue by the intumescent lens, and the filtration angle is thereby closed. The angle may be organically sealed by cellular products, although judging from the measurements given by Ischreyt, the obliteration is not organic but rather functional. It cannot be denied that in some of the cases there is a general predisposition to glaucoma, and that the swelling of the lens, which would have done no harm in a normal eye, provokes in a predisposed eye an access of hypertension.

Prognosis depends largely upon the celerity with which operation is undertaken. In Ischreyt's case perception of light was lost after the glaucoma had lasted one month, and in Frenkel's case after two months. It is not advisable to trust to local treatment. After a rapid preparation by myotics, surgical intervention is called for. Although Elschnig obtained an excellent result by immediate extraction of the lens, the *consensus* of opinion is that the operation in question should be preceded by a preliminary iridectomy.

SYDNEY STEPHENSON.

OPHTHALMOLOGICAL INSTRUMENTS

MADE BY

E. B. MEYROWITZ,

LONDON, PARIS AND NEW YORK.

(1) The Ophthalmo-diaphanoscope. Dr. Carl Hertzel.

(2) Modification of the Wells Handy Phorometer. Dr. J. H. Clairborne.

(3) Stigmometric Distance Test Card and Reading Test Type for Illiterates.

The above instruments are briefly described below—further information will be gladly given upon application, or, by arrangement, they can be obtained upon trial.

(1) The Ophthalmo-Diaphanoscope, Dr. Carl Hertzel, consists of an 80 candle power electric lamp, surrounded by a water jacket. The lamp is $\frac{3}{4}$ inch in diameter and is of sufficient length to allow it to be inserted to the farthest extent of the oral cavity, while the terminals and water pipes are sufficiently remote from the patient to be quite safe from administering an electric shock.

The lamp is silvered at the end so that the light is reflected in a direction upward and backward toward the other end of the instrument. By reason of the concentration and reflection of the light, the transillumination value of the lamp is 100 candle power.

For the transillumination of the eye an entirely dark room is necessary and a black face mask with openings for the eyes must be used over patient's face.

After the cooling apparatus is working properly, the instrument is placed as high and as far back in the oral cavity as possible, bringing the source of the light at the back of the soft palate.

The current is now turned on, the pupils of the patient light up and it is possible to see without any practice, pupillæ, retina and choroid. The observer, to secure the best results, approaches the patient, eye to eye, until their eyebrows almost or quite touch. The observation of hypermetropic cases requires no aid, but if either the observer or patient is myopic, a concave lens should be held before the examined eye. The maximum illumination, as might be expected, is in the lower angle of the orbit, and for the best results the eye should be caused to rotate by having the patient direct his gaze in certain directions, so that the portion of eye to be examined may be brought into the strongest part of the field. The picture is seen erect, but an inverted image may be secured in the regular way by means of a convex lens. The best illumination is obtained with the direct image. Enlargement of the pupil is not necessary.

Attention is directed to the fact that in this method there are no reflections and that an examination can be made without any special preparation in the technique.

Wholly or partly opaque foreign bodies are sharply defined and easily located, and if used during the operation for their removal the diaphanoscope is very useful, the field of operation being in no way circumscribed.

An attachment is made which enables the instrument to be used from without in the manner of the Sachs or Wurdemann transilluminator. The diaphanoscope is designed to operate on electric light circuits of 100 or 200 volts. In case of the latter voltage it is advantageous to use a regulating resistance.

(2) The Wells phorometer, which was described in THE OPHTHALMOSCOPE for March, has recently been improved by Dr. J. H. Clairborne, of New York. The improvements consist of engraving the scale for Ex. and Es. on one side and the scale for R. and L. hand on the other, so that instead of changing the position of the prism, the instrument may be used for testing either vertical or lateral deviation. In using the instrument in hyperphoria the instrument is held before the right eye with prism uppermost. In testing for Ex. or Esophoria the instument is held before the right eye with the prism at the temporal side.

(3) Stigmometric Distance Test-Card and Reading Test-Types for Illiterates. Dr. Percy Fridenberg, New York. These types for illiterates have been devised to correspond, as to distances and method of using, with the familiar Snellen opto-types and with the usual Jæger test-type for reading distance. The stigmometric reading card consists of groups of fine dots of graduated and regular size and interval, to be counted by the patient as a test of vision and accommodation, and as a very fine measure of the near and far point of reading range. There is no practical reading test for children and illiterates, while a knowledge of the accommodation limits and the vision at short range is of great diagnostic importance. Very young children do not even "know their numbers." The dots can be pointed out by teacher or physician, and the child asked how many dots are in this or that group: older children and adults are merely told to read off the numbers of dots in successive groups. The first paragraph of smallest and most closely spaced dots corresponds to Jæger No. 1 to No. 4, and represents fine type. The middle paragraph has dots more widely spaced, and is equivalent to Jæger No. 5 to No. 8, or medium type. The third paragraph is equal to Jæger No. 9 to No. 12 or coarse type. The distance test card is similarly composed of black squares of the same width as the arms of the Snellen "pot hook" figures for the corresponding distance.

(Section on ophthalmology, New York Academy of Medicine, Feb. 21, 1910.)

The May 1910, "Meyrowitz Bulletin" (American Edition) can now be obtained on application to E. B. Meyrowitz, 1A, Old Bond Street, London.

III.—A FORM OF OPTIC NEURITIS PECULIAR TO ADOLESCENTS.

Gorse. — Observations on a form of optic neuritis peculiar to adolescents. (Quelques considérations sur une forme de névrite optique spéciale aux adolescents.) *Recueil d'Ophtalmologie*, octobre, 1909.

Cases of transitory optic neuritis or pseudo-neuritis occurring in adolescents have been described and the causes ascribed to emotion, fatigue, and suppression of the menses. **Gorse** describes a case due to traumatism. A man, aged 24 years, was struck on the left eye by a piece of bread thrown by a fellow-worker fifteen days before admission into hospital. He had closed his eye before the bread struck him ; his upper lid was slightly ecchymosed but there was no apparent lesion of the globe. The patient noticed an immediate diminution of sight in the left eye and next day he suffered from severe headache, which recurred every day about four o'clock in the afternoon. Three days after the accident, vision improved and was practically normal at the end of twelve days, but the headache continued until his admission to hospital. At that time R.V.=1 ; L.V.=$\frac{7}{10}$; c. $\frac{+1.25}{+1_{90}}$=1. Ophthalmoscopically, it was found that the left disc was markedly œdematous—papillary stasis. There was also slight papillary stasis of the right eye. The headaches were aggravated by the mercurial treatment adopted and instillation of pilocarpine drops was inefficacious. Treatment was therefore given up at the end of six weeks. A fortnight later the headaches were considerably better, but the optic neuritis in the left eye was stationary, whilst that in the right eye had assumed the same appearances as that in the left eye. Vision unchanged. In another three weeks the headaches had disappeared ; but the optic neuritis remained unchanged. The patient was discharged. He returned three months later, and there was no trace of œdema of the discs.

In discussing the pathogenesis of this condition, the author dismisses hæmorrhage into the optic sheath, as the injury was too slight, the neuritis was not confined to the side injured, and there was no consecutive atrophy. He therefore classifies the condition as a transitory pseudo-neuritis due to slight injury, whose mode of action he does not attempt to explain except to say that the physiological functions of the optic nerve, owing to its extremely delicate structure, do not tolerate well the slightest variations of tension or pressure in the liquids which bathe its conducting fibres.

J. Jameson Evans.

IV.—OPTICO-CILIARY RESECTION.

Löhlein, W.—The value of resectio optico-ciliaris. (Zur Bewerthung der Resectio optico-ciliaris.) von Graefe's *Archiv f. Ophthalmologie*, Bd. 57, 2 Heft, 10 Mai, 1910.

Lohlein's paper is based on the history of 73 cases, 35 of which were observed for more than one year. Optico-ciliary resection appears preferable to excision of the eyeball where the eye is hopelessly blind and painful, if the

operation should offer a reasonable prospect of removing the pain permanently and not materially interfering with the patient's appearance. Unfortunately, the first condition will be realised with any degree of certainty only where the primary cause of pain does not persist; otherwise pain will return, as a rule, when the regeneration of the ciliary nerves takes place. Results in primary glaucoma were very poor accordingly, while a considerable number of cases with secondary glaucoma were successful. Some success was also obtained in chronic iridocyclitis, phthisis dolorosa, keratitis vasculosa, etc. But the number of these cases is rather restricted, as we must exclude every instance where the possibility of sympathetic ophthalmia is present, and also when other operations, as iridectomy or cyclodialysis, offer a chance of removing the pain. It must also be admitted that just those cases which otherwise offer the best field for the operation, as, for instance, secondary glaucoma, are most liable to skrinking of the eyeball, not, indeed, directly owing to the operation, but in the natural course of events; also that squint in the operated eye can hardly ever be obviated. Of course, the cosmetic effect must be judged according to the social position of the patient, but, anyhow, the indications for optico-ciliary resection are considerably narrowed down. Löhlein finally emphasises the rule never to resect where there is the remotest possibility of an intraocular tumor.

R. GRUBER.

V.—EVULSION OF THE OPTIC NERVE.

1) Stoewer, P.—Two cases of evulsio nervi optici (Zwei Fälle von Evulsio nervi optici.) *Klin. Monatsbl. f. Augenheilkunde*, April, 1910.

2) Birkhäuser, Rud.—Evulsio nervi optici partialis. *Ibidem.*

(1) In the first of Stoewer's two cases the point of an umbrella had been thrust into the orbit at the inner canthus of the left eye. The latter was dislocated in front of the lids and quite blind. On ophthalmoscopic examination, the disc was hidden from view by a grayish mass in the vitreous, above which a white discoloration of the retina was noticed, while the rest of the fundus had a nearly normal color, and was dotted with hæmorrhages. The arteries were invisible, the veins dilated and blurred in outline. The eye was removed, two days after the accident, on account of threatening cerebral complications. Sections showed complete absence of the optic nerve within the nerve-sheaths, the latter containing vitreous, blood, and fibrin. Within the scleral canal there were remnants of the lamina cribrosa and nerve fibres, the optic nerve being absent only from the centre. The retina was detached by hæmorrhage immediately above the disc, but only to a limited extent. Apart from smaller retinal hæmorrhage, there was a massive extravasation in front of the disc projecting into the vitreous. The arteries were collapsed, the veins turgid.

The second case was that of a boy, whose left eye had been struck with a tick a fortnight before he was seen by Stoewer. The eye was and remained blind; externally it showed ptosis and a scar in the conjunctiva six millimetres below the limbus. The vitreous was opaque at first, but gradually cleared, and the fundus was visible two months after the accident. The entrance of the optic nerve appeared as a white disc with a projection into the retina upwards and inwards. It was devoid of vessels and surrounded by hæmorrhage.

Retinal vessels were visible only in the periphery except one vessel which started at the lower margin of the disc and ramified in a retinal sector of grayish-white colour. Eleven months later, well filled vessels were seen spreading from all sides of the disc into the periphery; there were also numerous white streaks underneath the vessels, similarly distributed. Later on, the lens became opaque. C. MARKUS.

(2) **Birkhäuser** gives the ophthalmoscopic picture of a partial evulsion of the optic nerve caused by the thrust of a cow's horn. There was a moderate protrusion of the eye, laceration of the lids and conjunctiva, and impairment of vision; fingers were counted at one metre and the upper half of the field was obliterated. The media being clear, the fundus could be seen distinctly. The lower fourth of the disc was occupied by a black excavated crescent-shaped area of sharp outlines. At its lower margin, retinal vessels, covered with sausage-shaped hæmorrhages, ended abruptly. Of the other retinal vessels, the arteries appeared thin, the veins dilated. The last examination of the patient took place six months after the accident. V. was then 1/4, the field as before, the hæmorrhages had disappeared, and the hole in the disc was filled up with white scar tissue. C. MARKUS.

VI.—GLIOMA OF THE RETINA.

(1) **de Gouvea.—On the heredity of glioma of the retina.** (L'hérédité des gliomes de la rétine.) *Ann. d'Oculistique*, janvier, 1910.

(2) **Calderaro.—A Contribution to the Study of Incipient Glioma of the Retina.** (Contributo allo studio dei gliomi incipienti della retina.) *La Clinica Oculistica*, Gennaio-Febbraio, 1910.

(1) **de Gouvea,** of Rio Janeiro, removed the right eye of a boy, aged two years, for glioma of the retina in 1872. There was no recurrence, and on growing up, the patient married a lady in whose family there was no tendency to the formation of neoplasms, and had 7 children, the second and third of whom, both girls, died of double retinal glioma. This case was published in Portuguese in 1886, and is repeated in French in answer to the statement made by von Hoffman, Junr., at the Heidelberg Congress in 1908, namely, that with the exception of a case on which he was reading a communication, there was no instance on record of anyone who had been operated on in childhood for glioma of the retina having children suffering from the same disease. de Gouvea also refers to a similar case quoted by Owen in an article in the *Royal London Ophthalmic Hospital Reports* for 1905. R. J. COULTER.

(2) To gain a correct idea of the relation of glioma to the retina, we must, says **Calderaro,** examine early specimens; there is no tumour which changes its characters with age as does glioma. The rarity of the disease and the tender age of the sufferers make these opportunities very rare. Calderaro's paper therefore merits special attention.

He has been able to examine four cases, in one of which there was a double tumour. The points of special interest, apart from the rosettes, are the origin of the new vessels and the formation of the neoplastic cords. From the reconstruction made by Cirincione, it seems that there is a dense felt of gliomatous cords, which for the most part have one calibre throughout the

individual length, but anastomose among themselves and vary in disposition. The longer the cord, the more undulated its course, while the short cords are almost rectilinear.

These cords are formed by the addition of coats of cells to the walls of capillaries, which are the sole vessels found in the growth : they give a certain strength to the vessel walls, and thus prevent the more frequent occurrence of hæmorrhage, which, however, is not infrequent, and sometimes gives rise to the idea that glioma is a vascular tumour, while, in reality, it is largely avascular. Neither are there any lymph vessels in the tumour.

The cells in contact with the vessels alone receive sufficient nutrition to exist, the others rapidly fall into degeneration, and hence the spaces between the cords are filled with necrotic masses.

As to the rosettes, which have been so much discussed Calderaro holds that they are most numerous in the stage at which the glioma begins to give rise to an increase of tension in the eye. They are rare in the early stages, and disappear when the tumour becomes calcified or perforates the globe.

By the system of reconstruction, he has been able to show that the rosettes are not sections of spheres but of masses, having the appearance of crumpled membranes, and that their lumen is never completely closed. He has not been able to discover a lining membrane to the internal surface of the rosettes, which has been described by previous authors. The cells of the rosettes he regards as modifications of the tumour cells, and states that he has seen often cells representing intermediate conditions.

By this system of reconstruction, Calderaro brings forward reasons, which seem convincing, to disprove the assumed relation between the rosettes of glioma and the somewhat similar appearances seen in some imperfectly developed eyes ; these latter conditions are merely folds of the retina.

HAROLD GRIMSDALE.

VII.—RING-SHAPED OPACITY OF THE LENS.

(1) Gifford, Harold.—Two cases of Vossius' ring-shaped opacity of the lens. *Ophthalmology*, January, 1909.

(2) Imai, S.—Clinical facts with reference to annular opacity of the anterior surface of the lens (Vossius). (Zur Kasuistik der ringförmigen Trübung an der Linsen-Verderfläche) (Vossius). *Zeitschrift für Augenheilkunde*, August, 1909.

(3) Steiner, L.—Ring-shaped opacity of the anterior surface of the lens after a gunshot injury of the orbit. (Ringförminge Trübung der vorderen Linsenfläche nach Schüssverletzüng der Orbita.) *Klin. Monatsbl. f. Augenheilkunde*, Januar, 1910.

(1) Gifford (Omaha, Nebraska) describes two cases of this interesting condition, first noted by Vossius at the International Congress at Lisbon in 1906. The opacity is the result of a contusion of the eyeball. It takes the form of a ring, whose diameter is about three millimetres, situated in or below the anterior capsule of the lens. It may be of brown colour, and visible on oblique illumination, or it may be seen only by transmitted light. It disappears in the course of a few weeks. Vossius thinks the opacity is due to the pupillary margin being pressed against the lens by the cornea, the brown-coloured

opacity being composed of iris pigment, the non-pigmented variety being due to degenerative change in the capsular epithelium. A. J. BALLANTYNE.

(2) **Imai** (Japan) collects the cases of Vossius' annular opacity of the lens following contusion which have been published, and describes three more cases which were seen at the Eye *Klinik* at Giessen.

T. HARRISON BUTLER.

(3) A young man was seen by **Steiner** 12 days after he had shot himself with a revolver in the right temple. The right eye was blind, slightly prominent and immobile, and the pupil was very wide and rigid. The fundus showed a rupture of the choroid and extensive haemorrhages at the posterior pole, while the periphery was normal. In the centre of the anterior surface of the lens was a very delicate circular opacity corresponding in size with a moderately contracted pupil; it was best seen with the ophthalmoscope, whereas it was hardly visible on focal illumination. The opacity was free from pigment, and had not changed its aspect two months after the first examination. Opacities of this kind denote an impression of the pupillary margin. In the present case, the bullet, grazing the sclerotic, caused a momentary rise of the intraocular tension and a vehement contact of iris and lens.

C. MARKUS.

VIII.—AN UNDESCRIBED COMPLICATION OF TRACHOMA.

Calderaro.—A hitherto undescribed corneal complication of trachoma. (**Sopra una complicanza corneale del tracoma ancora non descritta.**) *La Clinica Oculistica*, March, 1910.

The corneal change described by **Calderaro** has hitherto been confused with the calcareous and lead opacities which are not uncommon in trachoma, and it is only the improved methods of examination of the cornea, which have enabled him to make the separation.

The condition, which is found in about one per mille of all trachomatous eyes, is thus described.—"Case 1. Dattolo Leonardo, aged 22, has noted for four years the formation of an opacity in his right cornea, which, without giving rise to any discomfort, has gradually extended until it hides the pupillary area. In both eyes there is trachoma in the completely cicatricial stage; in the right cornea there is a prominent yellowish-grey *plaque* occupying the lower half of the corneal surface and stopping about two millimetres from the limbus. It measures 7 mm. in the transverse by 4½ mm. in the vertical diameter; the edges are notched and irregular. On examination with the corneal binocular microscope, one sees that the *plaque* is the result of the union of many smaller *plaques*, the more dense of which are yellow in colour. The vessels coming from the limbus have a considerable size and run in the cornea without any branching. As soon as they reach the edge of the *plaque*, they at once divide dichotomously, and form with the anastomosing branches of the neighbouring vessels, a vascular plexus limited to the area of the *plaque*. The curvature of the cornea is unaltered except in one point, at the junction of the middle and outer third; here a yellow accumulation forms a small prominence." A similar picture is given of other cases.

As to the causation of the disease, histological examination has convinced Calderaro that the starting point of the change is in the cells which surround

the minute ramifications of the new-formed vessels. These always have the structure of capillaries and very soon surround themselves with a coat of lymphoid cells. The capillary and its cellular sheet are situated in a space of the corneal lamellæ, along which can be seen thin flattened nuclei, like endothelium, lining the space here and there. The calibre of the capillaries varies considerably; those in the *plaques* are usually empty, those outside are crowded with blood discs. The cells of the sheath are of two kinds: one form have the appearances of lymphoid corpuscles, the others have larger nuclei, and more plasm; these stain with eosin and the larger individuals show dark granules. The latter cells have a special relation to the capillary wall. They do not form as a complete sheath, but the cells are attached to the walls of the capillaries. They are the important element in the new formation. In the first stage they contain fat granules, which give the yellowish tinge to the *plaques* mentioned in the clinical history. Calderaro has never observed any calcareous degeneration. HAROLD GRIMSDALE.

IX.—REMEDIES.

(1) Maloney, D. J.—Hyperchlorhydria and amblyopia. *Ophthalmology*, Vol. V, July, 1909.

(2) Chiari.—An Electric Thermophore for the treatment of eye diseases. (Elettro-termofero in terapia oculare.) *La Clinica Oculistica*, Diciembre, 1909.

(3) Darier, A.—The action of radium on the nervous system. *La Clinique Ophtalmologique*, 10 février, 1910.

(4) Cauvin, Charles.—Curious cases of idiosyncrasy of the eye to cocain and to atropin. *La Clinique Ophtalmologique*, 10 février, 1910.

(5) Lagrange.—Double retro-bulbar neuritis of syphilitic origin. Almost complete loss of vision. Cure by active compound treatment. (Double névrite rétro-bulbaire d'origine syphilitique. Perte presque complète de la vision. Guérison par un traitement mixte intensif.) *Archives d'Ophtalmologie*, février, 1910.

(6) Abbe, Robert.—Radium in surgery. *Arch of the Roentgen Ray* February, 1910.

(7) Deschamps.—A trial of serumtherapy in rheumatic affections of the eye. (Essaie de sérothérapie des affections rhumatismales de l'œil.) *La Clinique Ophtalmologique*, 10 mai, 1910.

(8) Dor, Louis.—Electro-Cuprol. *La Clinique Ophtalmologique*, 10 juin 1910.

(9) Le Couëdic.—An infective ulcer in a hereditary syphilitic girl. (Un ulcère infectieuse chez une syphilitique héréditaire.) *La Clinique Ophtalmologique*, 10 juin, 1910.

(1) Maloney's patient was fitted in 1902 with presbyopic glasses, and at that time had perfect vision, both distant and near. When seen again six years later she had been suffering for three years from dimness of vision, which could not be relieved by glasses. The pupils were slightly dilated and reacted sluggishly. There was some woolliness of the optic discs.

She had suffered from indigestion for six years, and the author diagnosed hyperchlorhydria, dilated stomach, and chronic gastritis. Under treatment with alkalies, dieting, &c., there was steady improvement. In three months

vision had improved from 20/200 and No. 4 Jaeger to normal both for distance and for near. A. J. BALLANTYNE.

(2) **Chiari** describes an electric thermophore made of a spiral of asbestos thread, 1mm. in diameter, round which is wound a nickel wire, 0·1mm. in diameter, the whole enclosed in layers of asbestos. There is an ingenious resistance, made of a series of incandescent lamps, by which the heat of the apparatus can be regulated.

The arrangement recalls that devised by Maddox, and described by him in Vol. XXIII of the *Transactions* of the Ophthalmological Society. In this paper, Maddox says that he has found it unnecessary to have asbestos as insulating substance and simply stitches "silk covered platinoid wire" to a piece of flannel. H. GRIMSDALE.

(3) **Darier** (Paris) says that a sufficient number of cases has been published, although not always with sufficient precision, to indicate that radium is of value as an analgesic in neuralgia and neuritis. It has also been efficacious in several cases of facial paralysis, in two of which a partial reaction of degeneration was present. Unfortunately, its action is very uncertain. The *technique* of application requires improvement. ERNEST THOMSON.

(4) **Cauvin** (Nice) relates an interesting case in which on each of five occasions the instillation of cocain for the removal of foreign bodies from the eye of a male patient, aged 54 years, there resulted an œdema of the lids and face, with conjunctival chemosis and lacrymation. There was neither pain, rise of temperature, enlargement of glands, nor itchiness. At the end of four days little vesicles formed in the skin. These rapidly dried up and the skin returned to normal. Finally, the sixth time this man had a foreign body in his eye, stovaine was used without any similar consequences. The patient was rheumatic. The author, in comparing these symptoms with similar occurrences which occasionally follow the use of atropin, suggests that in the case of the latter drug the œdema is accompanied by eczematous desquamation and intense itchiness, symptoms which do not accompany the swelling and chemosis due to cocain. ERNEST THOMSON.

(5) **Lagrange**, of Bordeaux, records a satisfactory result by active anti-syphilitic measures in a case of double retro-bulbar neuritis. The ætiology was obscure, but in the absence of other causes and on account of some slight improvement effected in other hands by intramuscular injections of benzoate of mercury together with iodide of potassium by the mouth, it was decided to proceed further on anti-syphilitic lines. Accordingly, 1½ centigrammes of biniodide of mercury were given every other day with 5 grammes of potass. iodide daily for six days. Vision improved during that time from R. $\frac{1}{30}$ L. $\frac{1}{20}$ to R. $\frac{2}{3}$ L. $\frac{1}{4}$. Mercury was then discontinued and the potassium iodide reduced to 3 grammes daily. Some five weeks later the R.V. was normal and L.V. nearly so. The fields of vision, which had been much curtailed in their lower areas, with absolute central scotomata, were completely restored. BERNARD CRIDLAND.

(6) **Abbe**, of New York, describes his experiences of radium, which he has employed since January, 1903. He lays stress upon the need of studying the dosage and of standardizing specimens of radium before they are employed. He recommends the photographic method of labelling every specimen of radium used with a standard of ten milligrammes of pure radium bromide.* Verification of specimens bought in the open market can thus be made by any amateur, and the true working value determined. The product has what may be described as a specific action in warts, papillomata of the vocal cords and larynx,

* The test is by means of photographic films covered with two layers of light-proof paper which are exposed through a slit in a lead plate for various lengths of time, and the effects compared with that of a given unit of 10 mg. of pure radium bromide.—EDITOR.

senile keratoses, leucoplakia of the tongue and mouth, and epitheliomata. The case of a sarcoma involving the lid of a man of forty-five years, which had resisted X-rays and other treatment, is particularly striking. The tumour involved most of the lower eyelid. It formed a mass in which all semblance of the lid and cyclashes was lost, and grew equally on the conjunctiva, the eye, and on the skin. Strong radium was applied four times during the course of a single week. The results were extraordinary. Week by week, after these applications, the growth melted away, and after eight weeks, it had completely disappeared. No recurrence in five years. Well may Abbe remark: "Nothing so nearly resembling the marvellous has ever been my fortune to see in surgical work." SYDNEY STEPHENSON.

(7) In an interesting article **Deschamps**, of Grenoble, relates his experience with the Rosenthal-Berlioz anti-rheumatic serum. The three cases treated seem to have been undoubtedly cases of rheumatic iritis. They all improved very markedly under the injections of serum (twenty cubic centimeter doses), although the second case was somewhat spoiled as an observation by the performance of an iridectomy, on account of very rapid blocking of the pupil. Injections in these cases were given on two succeeding days and rapid and decided improvement occurred on the third day. But it was not all plain sailing, since two out of the three patients suffered from serum rashes and one of them was rather alarmingly ill after two injections, and was long in getting to be quite himself again. From a study of his three cases, Deschamps concludes that the Rosenthal serum has an evident action upon the ocular manifestations of rheumatism. This action is rapid but of such short duration as hardly to bring about definite cure. It is a method which should be added to those we already possess and one which can be used to give the case a good start towards cure. On account of possible serum accidents and anaphylaxis, the treatment must be carefully watched, and repeated injections, such as one would like to give, are rather contraindicated, until we can find some way of preventing such accidents. Chloride of calcium, in a dose of 2 grammes daily, has been recommended, but the results are not quite trustworthy. At the same time, out of the three patients treated by Deschamps, the one who had serious after-trouble was the only one who did not take the chloride of calcium. ERNEST THOMSON.

(8) **L. Dor**, of Lyons, treated a case of recurrent corneal erosion in a female patient, aged 28 years, who had had trachoma. He considered that the lesion was essentially due, not to any rough substance in the conjunctiva, but to "some trophic disturbance of nervous origin" and wondered whether electricity might have an action on this lesion. "Do not the molecules of the colloidal metals in electrically prepared solutions retain an electric charge?" On such an assumption, Dor prescribed electro-cuprol (Clin.) in the form of instillations, and from that day there had been no recurrences of the trouble in three months. Formerly they came twice a week. The author dismisses the idea that the cure was due to suggestion, because he made no suggestion to the patient about a cure by "bottled electricity,' but merely gave her a prescription in the ordinary way. ERNEST THOMSON.

(9) In this article **Couëdic** speculates as to the probability of an ordinary septic corneal ulcer, probably traumatic, being delayed in the healing by a hereditary syphilitic taint. The ulcer retrograded so far as to become clean under various treatments, including the injection of Roux serum, but remained torpid until, as the result of a suspicion about syphilis, mercurial inunction was employed. Very soon after this true healing began, and was complete in twelve days. ERNEST THOMSON.

CORRESPONDENCE.

While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

COLOUR BLINDNESS.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

In the notice of my book "Colour Blindness," which appeared in the June issue of THE OPHTHALMOSCOPE, the reviewer, Dr. T. Harrison Butler, entirely mistakes my meaning in one or two respects, and I much regret that this is possible in so able a man.

He credits me with saying that yellow and blue are the two colours seen by the dichromics. Now this is quite wrong, and in the passage to which he refers I am endeavouring to show how it is that the yellow of the buttercup, and the blue-violet of the cornflower are the two colours which stand out the most clearly to some dichromics. It is because these two colours occupy the central parts of the two bands of colour seen in the spectrum by this class of people, and here it is that the luminosity is at its highest pitch, and gives the appearance of colours, which to them are the highest development of their red and violet sensations.

On page 310 I state that "I have lately made enquiries of the railway companies (regarding their tests for colour vision) some adopt an efficient method of testing, but, on the whole, there has not been much change." As most of these still have the matter under consideration, it would have served no useful purpose to rewrite these chapters at the present time.

Yours &c.,

F. W. EDRIDGE-GREEN.

THE INSTITUTE OF PHYSIOLOGY,
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LONDON.
June 13th, 1910.

BOOK NOTICES.

Transactions of the Ophthalmological Society of the United Kingdom. Vol. XXX, Fasciculus 2. 1910. London: J. and A. CHURCHILL, 7, Great Marlborough Street. Price, 4s. net.

The second fasciculus of the thirtieth volume of the *Transactions* of the Ophthalmological Society, liberally illustrated with coloured and black-and-white plates, has recently been issued. Its more important contents will be abstracted in these columns in due course.

Anleitung zur mikroskopischen Untersuchung des Auges. (Guide to the Microscopic Examination of the Eye.) By Professor R. GREEFF. Berlin: Hirschwald. 1910.

All who are interested in the normal or pathological anatomy of the human eye, and particularly those who are engaged in the laboratories of ophthalmic hospitals, will welcome the appearance of a third edition of Greeff's "*Guide to the Microscopic Examination of the Eye.*"

The first edition was published in 1898, and the second in 1900. These volumes contained an account of the methods which Greeff himself employed, and which he taught in the classes he conducted so successfully for many years.

In the new edition the plan of the original work remains unchanged, but the reader will find that the description of some staining processes has been modified or amplified, and that information regarding a few new methods has been introduced. Greeff, however, has not only brought his work up to date, but by securing the co-operation of Professors Stock and Wintersteiner, has produced a manual describing the methods of microscopical research as practised in the ophthalmic laboratories of Berlin, Freiburg, and Vienna.

The last chapter of the book is from the pen of Professor Stock, and in it are detailed the methods employed in the examination of the conjunctival secretion, and in the detection of bacteria within the eyeball. The spirochæta pallida and "trachoma bodies" are noticed at some length.

We congratulate Greeff and his *confrères* on their work.

HUGH WALKER.

Serum Diagnosis of Syphilis and the Butyric Acid Test for Syphilis. By HIDEYO NOGUCHI, M.D., M.Sc., Associate Member of the Rockefeller Institute for Medical Research, New York. 14 Illustrations. Philadelphia and London: J. B. Lippincott Company. 1910.

The diagnostic value of the Wassermann reaction in cases of syphilis is now well established. Its mode of application is by no means difficult, but the principles involved require careful study, in order that the medical man may have a clear conception of the reaction itself. It was with the object of aiding the profession to obtain a first-hand knowledge of these principles that the present work was undertaken by the author. It gives a brief but adequate account of the principles of serum hæmolysis and of the behaviour of the combinations of antigens and antibodies towards hæmolysis. By the term serum hæmolysis we imply that when the red blood cells of animals are brought into contact with certain substances their hæmoglobin is set free, while the stromata also goes into solution, as a rule. The fresh blood-serum of many animal species is hæmolytic for the red blood cells of some, but not all, other species. Hæmolysis results from the co-ordinated action of two distinct factors, the *amboceptor* and the *complement*. The latter is very unstable and disappears from serum within a few days when kept at room temperature. The former is more stable, and may still be found active in serum which has been kept for more than a year. In any serum there are usually present many varieties of amboceptor. Thus, there may be present amboceptors active against the blood corpuscles of the sheep, dog, rabbit, frog, and man. By repeated injections of human red blood corpuscles into the rabbit, we can produce a specific amboceptor for human cells. This process is known as immunization, and by this means we can produce a specific amboceptor for any kind for foreign red blood cells. A similar phenomenon is observed if we inject bacteria. In this way what are known as bacteriolytic amboceptors can be readily produced. Bacteria, when heated with these, absorb them and become sensitive to the dissolving action of the complement. This dissolution phenomenon is now known as bacteriolysis.

It has been found that, when egg-albumin and alien blood-serum, for example, are injected into an animal, they give rise to what are termed *precipitins*. A substance, be it blood corpuscle, bacteria, or protein material, which, when injected, produces corresponding specific reaction products, is

called an *antigen*. The reaction products, of whatever kind, which are produced by the animal are known as *antibodies*. "Working with three different antigen-antibody combinations, namely, precipitates formed by mixing human serum, egg-albumin, and meningococcus extract with their specific precipitins, the writer has found that the fixability of the sera complement of various animals differs widely. Guinea-pig's complement is most easily fixed, goat's complement being hardly fixed at all. The complements of man, horse, ox, sheep, and rabbit are fixed in intermediate and varying degrees to those mentioned before. In performing these experiments two different amboceptors (both specific for human corpuscles) produced in rabbits and goats were used. Rabbit's complement possessed, as a rule, the best reactivating property for the rabbit's amboceptor, but the complements of sheep, pig, and ox seemed often devoid of this property. The complements of man, goat, and horse are weakly reactivating for this amboceptor. The amboceptor from goats could be reactivated by all of the above sera excepting that of pigs, although goat's serum was most effective and guinea-pig's somewhat less so." The method of determining the presence of a specific reaction between antigen and antibody has been applied to syphilis, and the details of the application of this principle are fully given in the pages which follow.

The fact has long been common knowledge that syphilis is an infectious disease which eventually confers immunity upon the patient. This immunity in all probability implies that antibodies have been produced. At the present moment we cannot determine the presence of antibodies by the direct observation of such a reaction as bacteriolysis or agglutination. It is in the late stages of the disease, when the spirochæte is present in very small numbers, that a measure of immunity is developed and specific antibodies are probably already formed. Taking advantage of this view, we take syphilitic tissues at a stage when the spirochætes are most numerous and use this as the known antigen. Tests against this known antigen with the blood serum of other patients might, it was hoped, reveal the presence of an antibody. Wassermann was the first to publish this indirect method of detecting the syphilitic antibody. This was in 1906. Other workers on the same subject were Neisser, Bruck, and Detre. The *technique* of the method is as follows:—

"Extracts of syphilitic tissues in the active stages of the disease were made and used as antigen. Wassermann, Neisser, and Bruck used the liver of a congenitally syphilitic fœtus, and Detre employed chiefly condylomata for this purpose. Serum of known syphilitics, inactivated at 50°C., was used as antibody. To this combination complement was added. So far there was no visible change. If, after a short time, a quantity of immune hæmolytic amboceptor was added to the mixture, and then the cells for which this amboceptor was developed, no hæmolysis took place. . . . If in place of the blood-serum of a known syphilitic there had been used as unknown antibody the blood of a person known never to have had syphilis, hæmolysis would occur, because the complement was not interfered with." It is, therefore, established that if the blood-serum of a syphilitic patient be mixed in the presence of complement with extracts of syphilitic livers, with alcoholic extracts of certain normal organs, or with crude tissue-lecithin preparations, the complement will be fixed and prevented from taking part in a subsequent hæmolytic reaction. "Starting with the extracts given and mixing with them, in the presence of complement, serum of unknown origin, if complement be fixed it can be stated with comparative assurance that the unknown serum was derived from a case of syphilis."

In order that the Wasserman reaction might prove more generally accessible, the author has considerably simplified it. In the work before us a full and most explicit account of this simplified process is given, which is illustrated by means of coloured diagrams, so that anyone with a modicum of skill will be enabled to carry out the reaction with comparative ease. The original Wassermann method is also elaborately described. As regards its diagnostic value, the author supplies a series of most instructive tables. Our readers will be particularly interested in the table in which the writer gives the results of the application of his system to 29 cases of eye diseases of all sorts. This we reproduce in full:

	Cases examined.	+	−	±
Keratitis interstitialis	12	8	4	0
Iritis	6	4	2	0
Scleritis	1	0	1	0
Paralysis external rectus	1	0	1	0
Optic neuritis	1	1	0	0
Choroiditis exudat.	1	0	1	0
Optic atrophy	5	0	5	0
Acromegaly with ocular symptoms	2	1	1	0
	29	14	15	0

The effect of treatment upon the Wassermann reaction is an interesting subject, discussed at some length in this volume. The author finds that the reaction is markedly affected by the treatment of the disease, but that some cases frequently persist in giving a positive reaction in spite of what is done for them. In hereditary cases of the disease the reaction persists, even in spite of the most rigorous therapeutic measures. The disappearance of the reaction under treatment is probably no justification for the cessation of that treatment.

Reference is also made to what is known as the Butyric Acid Test. This test is carried out in the following manner:

"One part of clear serum, free from hæmoglobin, is mixed with nine parts of a half-saturated solution of ammonium sulphate, the precipitated globulin centrifugalised by a powerful machine, and the compact globulin fraction separated by decantation from the supernatant fluid. The deposit may now be weighed to obtain an idea of its quantity. It is then redissolved in ten parts of 0·9 per cent. salt solution, and is ready for the test. The test is made by mixing one part of the solution with an equal part of 10 per cent. butyric acid solution, when a prompt, dense, milky turbidity appears in the mixture if the serum tested was derived from cases of syphilis, while it remains clear, or shows only a slight opalescence without precipitation after several hours' standing, if it was derived from persons not suffering from syphilis." In cases of undoubted syphilis the butyric acid test gives a higher percentage of positive results than that of Wassermann in cases of nervous affections. It is, therefore, a valuable "addition to our diagnostic methods in the detection of parasyphilitic diseases of the central nervous system and of cerebrospinal syphilis." The reaction has advantages over that of Wassermann, as when a negative result is obtained by means of the latter, absence of syphilitic infection cannot always be inferred.

A careful study of this admirable monograph has convinced us that the writer is a worker of great experience, and one who has devoted a great amount of time to the perfecting of his methods of investigation. He has

certainly supplied the profession for the first time with a clear and accurate account of the whole subject of the serum diagnosis of syphilis. It is by no means an easy matter to present a statement of the somewhat complicated principles involved in an easy accessible form, but Dr. Noguchi has achieved his difficult task in a manner reflecting great credit upon himself and displaying his masterly knowledge of the subject. No one who studies these pages carefully can fail to grasp the author's meaning: while those who wish for further enlightenment will turn with advantage to the very complete bibliography appended to this volume. Dr. Noguchi is to be congratulated on the completion of his labours, and this monograph will long be recognised as by far the best introduction to the study of the serum diagnosis of syphilis in the English language. We trust that it will help to popularise this method of diagnosis with the medical profession in this country. JAMES BURNET.

Das Trachom in Ost Preussen. Kurzgefasste Darstellungen: seiner Pathologie und Therapie. (Trachoma in East Prussia: its Pathology and Treatment.) By Dr. KÜSEL, Statsarzt, Gumbinnen. Theil I. Pathologie. Halle: Carl Marhold. 1910. Preis 1 Mark, 80. Pp. 80.

Trachoma, or granular lids, has long been known, and is of frequent occurrence in many countries, both in its acute and chronic form. Wherever there is a poor, ill-fed, and badly housed population, living in a cold and damp climate, there the disease is rife. As it is contagious, particularly affecting the delicate membrane lining the lids and reflected upon the globe, it is common in children, and as the conditions which favour its occurrence are persistent, it assumes a chronic form, which, when it does not lead to complete loss of sight, so seriously impairs vision as to render the unhappy victims of the disease incapable of undertaking any remunerative employment. It seems to have been known to Hippocrates, to the Roman physicians, to the Chinese, and to the ancient Egyptians. At the present time it is widely spread in Russia, especially in the Crimea and the Russian Provinces on the eastern shores of the Baltic, as Livonia, also Finland. Siberia is strongly infected, the Cisleithian provinces of Austro-Hungary, East and West Galicia, Dalmatia, Krain, Austrian Silesia, Bohemia, the Italian Tyrol, Lower Austria, and Vienna, Steiermark, Carinthia, are all affected, and in the Transleithian districts (Hungary) are two large centres of trachoma, a southern and larger one between the rivers Danube and Theiss, and a smaller and more northern one in the neutral territory. But it is not in those countries alone that trachoma is to be found. It is common in Turkey, Roumania, Bulgaria, and Greece. In Italy it is as frequent as malaria, and it is common in Spain. On the other hand, Switzerland, except in the districts bordering upon Italy, from whence the disease, as it were, slipped in without obtaining a firm foothold, is comparatively free from trachoma. France, except in the province of Languedoc, is not specially trachomatous. Great Britain, into which country it was introduced by the Egyptian campaigns of the earlier years of the 19th century, is now, with the exception of certain parts of Ireland and Scotland, free from it; nor is Denmark seriously affected by it. Many cases occur in Palestine; Arabia, Mesopotamia, and Persia are all strongly affected. In India, more cases occur in Bombay than in Calcutta. In Ceylon it is of rare occurrence. In Central Asia, according to van Millingen, 90 per cent. of the population are affected. The East Indian Archipelago, the Sunday Islands with their Malay population, and the Mongolian races inhabiting China and Japan are prime seats of trachoma. In Australia, it

has gained an entrance through foreigners. In Africa, it is extraordinarily frequent, not only in Egypt but in Senegal and the Niger river region, and amongst the Kaffirs. It is widely distributed in America, especially in the United States and along the course of the Mississippi. In the Argentine Republic it is extensively diffused.

Trachoma, then, is seen to be responsible for a large proportion of the eye disease of the world, and abundant evidence of its contagious nature is forthcoming from those who have examined its spread, and it has been actually communicated to animals by inoculation. Yet in regard to its ætiology little is known. The above enumeration of the regions in which it is prevalent precludes the idea that it is essentially due to climatic or telluric agencies or to peculiarities of race, whilst statistics show that neither age nor sex is exempt. Scrofula and tuberculosis strongly predispose to its occurrence. A bacterial origin seems to furnish the most reasonable hypothesis of its occurrence, and this is supported by the researches of Halberstädter and Prowazek in 1907 who under the title of "chlamydozoa" have described exceedingly minute particles which are to be found in the epithelial cells of the granular conjunctiva and can be rendered visible by the v. Giemsa method of staining, and which either are or may be the means of conveying the contagion. The contagion requires long and intimate exposure to act and soon loses its virulence, so that the propagation of the disease is prevented by the employment of the simplest hygienic means. It is not easy to explain why one eye alone is in some cases affected. The event is, however, rare, as Kuhnt only records 19 unilateral cases in 3000. Follicles develop from several sources of contagion; thus, they appear after infection with pneumococcus, with the Koch-Weeks' bacillus and with Sattler and v. Michel's diplococcus, but none of these forms runs through the stages of trachoma, but disappears with the removal of the excitant. In a large field of study many forms and varieties appear, in some instances being acute with great irritation, in many presenting mixed features, due to infection with other bacilli, in some developing internally and unobtrusively. Trachoma was first carefully studied in the Napoleonic and English campaigns in Egypt and in Russia at the commencement of the 19th century. Though the disease lost its frightfully destructive character at the close of the war, it has remained in a chronic form in several districts of the Prussian monarchy, as in Posen, in some parts of Pomerania, in Silesia, Saxony, and the Rhine provinces. In these parts its ravages are so great that very active measures have been proposed and practised in the more important German industrial centres with the object of, if possible, abolishing, or at least of controlling, the effects of the disease upon the individual and its dissemination through the community. Lectureships have been instituted, special courses of instruction have been organised, and great pains have been taken to diffuse amongst the populace in a dangerous region a knowledge of its contagious character, and of the most appropriate mode of dealing with it in its early period, when it is most amenable to treatment. Privy Councillor Dr. H. Kuhnt, then the director of the ophthalmic department of the University of Königsberg, drew up a scheme, which embraced the following points: the education of a number of practical physicians to treat granular lids; systematic examination of the scholars of all schools; isolation and treatment in hospital of all cases diagnosed to be those of granular lids; persistent treatment of such cases; instruction to the laity; free treatment on application.

Slight injuries often prove the starting point of trachoma, and the earliest trace of the disease consist of minute spots in the folds of the conjunctiva, between the lids and the globe, with diffuse infiltration and thickening of the membrane. The lower fold is most frequently affected, according to Kuhnt,

in five-sevenths of the cases; the upper fold in two-sevenths, and the plica semilunaris in 9 per cent.; and Küsel describes in considerable detail the phenomena of the development, regression, and the sequelæ of the disease, such as alteration of the curve of the lid, ill-developed and ill-formed cilia, cicatrices, trichiasis, entropium and ectropium, pannus, and keratectasia.

He then gives a description of some special and peculiar forms, and treats of relapses. The complications may be said to include all those conditions that are established by the various bacilli, pneumococcus, diplococcus (Morax-Axenfeld's), Koch-Weeks' bacillus, and gonococcus, for the growth of which the condition of the membrane is so favourable. The tear ducts are often implicated. The prognosis is essentially dependent upon the limitation of the disease and upon the treatment. If the disease is confined to the conjunctiva of the lids, if the region affected is well defined, and if neither catarrh complicates the case nor scrofulosis is present, recovery under operative treatment may take place in from three to four weeks.

The varied form presented clinically by the disease is dominated by well marked hyperplasia of the lymphatic elements of the conjunctiva, and particularly (at the commencement) in the subepithelial adenoid stratum of the membrane. Whether follicles are normally present in the conjunctiva of man seems to be doubtful, but in the disease numerous small collections of lymph cells appear, and these gradually form the initial nodes of Addario, and in stained preparations present a clear nucleus and layers, and a darker stained outer zone of smaller cells. The central cells are for the most part mononuclear. There are also larger cells which exhibit amæboid movements. Addario regards these as connective tissue cells of the network of the granule. At a later period polynuclear leucocytes are to be found, and sometimes many erythrocytes. The granule then exhibits a network of vessels. Surrounding the granule is a diffuse small-celled infiltration, but the granules have as yet no investing membrane or capsule. A regressive metamorphosis is then established: the cells break down, especially around the phagocytes, and a capsule surrounds the softened mass. Then, at a later stage cicatricial tissue forms, thickening the lid, roughening and modifying its form, and establishing the subsequent changes in the cornea. HENRY POWER.

NOTES AND ECHOES.

Appointments to the Household of His Majesty.

THE *Gazette* of June 10th announced the following appointments in connection with the Household of His Majesty King George V.:

To be Surgeon-Oculist to His Majesty, Sir George Anderson Critchett, Bart., C.V.O., F.R.C.S.Edin. To be Honorary Surgeon-Oculist to His Majesty in Scotland, George Andreas Berry, M.B.Edin. To be Honorary Surgeon-Oculist to His Majesty in Ireland, Charles Edward Fitzgerald, M.D.

* * * *

Appointments.

Dr. D. Leighton Davies has been appointed honorary assistant ophthalmic surgeon to the Cardiff Infirmary.

Mr. Frank Moxon has been appointed assistant in the Refraction department for School Children at the Moorfields Hospital.

Mr. Cyril H. Walker has been re-appointed ophthalmic surgeon to the Bristol General Hospital.

Mr. Herbert F. Shorney has been appointed assistant ophthalmic surgeon to the Adelaide Hospital, South Australia.

Mr. E. V. Oulton has been appointed an assistant inspector of the first class and surgeon to the Ophthalmic Hospitals of Egypt.

Dr. H. M. Traquair has been appointed assistant ophthalmologist to the Leith Hospital.

* * * *

Deaths.

THE death of George Reid Simpson, an eye and ear specialist, took place at Toronto, on April 8th last, at the early age of 36 years.

The deaths are announced of the following American ophthalmic surgeons:—W. S. Parker (Trenton), Wm. D. Fry (Marshalltown), J. R. Kewley (Chicago), and G. P. Pond (San Francisco).

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Section of Ophthalmology: British Medical Association.

AS readers of THE OPHTHALMOSCOPE know, the section of ophthalmology of the British Medical Association will assemble on July 27th, 28th, and 29th next. There will be three discussions, namely:—(1) "The Future of Ocular Therapeutics": (*a*) Local and General, Dr. G. A. BERRY (Edinburgh); (*b*) Bacterial Products, Dr. J. W. H. EYRE (London). (2) "The more Chronic Forms of Anterior Uveal Inflammation"; (*a*) Extra-Ocular Manifestations, Mr. HOLMES SPICER (London); (*b*) Intra-Ocular Manifestations, Mr. STEPHEN MAYOU (London). (3) 'The Diagnostic Values of Ophthalmoplegia, Partial and Total," Dr. RISIEN RUSSELL (London).

The following resolution will be brought forward on the third day of the meeting:

In view of the importance of obtaining continuity of treatment of defects of vision in school children throughout the period of education, and of proper co-ordination of medical inspection and treatment it is the opinion of the Ophthalmological Section of the Association that the organization of school clinics is desirable

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Federation of Optical Societies.

AT a recent meeting held in Manchester representatives from eight organizations considered the question of establishing a federation of optical societies in Great Britain, the ultimate aim being, of course, to secure a legal status for qualified opticians. A resolution to that effect, leaving out any reference to the question of legal status, was adopted unanimously by the meeting.

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Instruction in Refraction.

THE following notice has been issued to medical men, including some ophthalmic surgeons, by an enterprising firm of Bloomsbury opticians:—

"In recent years a very large number of Medical men (General practitioners) have taken up this most important and remunerative section of their profession, viz., "The Testing of the Eyesight," and their practice has risen considerably through the same.

We fit up, and assist Medical men all over the Kingdom in this direction in every detail, viz., we supply all the latest books of instruction free, and those who are near London, or can call at any time, we give them tuition free. We supply boxes of trial lenses and cylinders, &c., complete at the lowest cost of production, up-to-date, easy and quick system of facial measurement in cases, and all the necessary wall and test-type charts. We provide prescription forms and cards with Doctor's name and address free. These when filled are made up at our own works and returned in a few hours after receipt at the lowest possible charges.

The subject is easy and Doctors become proficient very quickly. Send us a post-card and one of our representatives will call.

We are manufacturing Opticians making a speciality with Medical practitioners, and have already on our list over 1800, and are also the Appointed Opticians to leading Eye Infirmaries throughout the Kingdom."

* * * *

University of Oxford: Diploma in Ophthalmology.

THE diploma class at Oxford consists of some fifteen members, of whom eight come from England, one each from Ireland, India, and America, and the rest from the Colonies. Systematic lectures upon the anatomy and physiology of the eye, as well as upon ophthalmology, have been given, and practical physiological optics has played a large part in the curriculum. A week of advanced lectures upon various subjects connected with ophthalmology will commence on July 11th. The examination begins on July 19th

Speaking of the diploma, the following letter, signed by Dr. J. C. McWalter, of Dublin, was published in our contemporary the *British Medical Journal* of June 11th last:

"Surely the British Medical Association should protest against the proposal to institute a diploma in Ophthalmology at Oxford? After such an important precedent every university will feel bound to confer a diploma in some branch of medical service in otology, rhinology, proctology, urology or the like—and a multiplication of certificates will result which will reduce the universities to the status of competitive diploma shops. I submit that the British Medical Association, being officially in favour of a one-portal system, is bound to discountenance a multiplicity of diplomas."

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Continental Items.

Dr. Martin Zade has been recognised as *privat-dozent* of ophthalmology at Jena.

Dr. Pfalz, of Düsseldorf, and Dr. Herzog, of Berlin, have received the title of professor.

Professor Dr. Bjerrum, of Copenhagen, is about to retire.

Professor Hess, of Würzburg, and Professor Wagenmann, of Jena, have declined calls to Heidelberg in succession to Professor Leber. The chair has now been offered to Professor Axenfeld, of Freiburg i. Br.

Dr. J. V. Spring has been appointed to the Eye, Ear, Nose, and Throat Department of the San Antonio Free Dispensary, Texas.

Drs. F. T. Rogers and G. W. van Benschoten have been appointed ophthalmic surgeons to the City Hospital, Providence, R.I.

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Medical disloyalty.

It may fairly be questioned whether medical disloyalty has ever been carried further than it is in the following communication, published in the *Optical Journal* (New York) of May 26th last:

HOW THE OPTOMETRIST CAN DO BETTER REFRACTION WORK THAN MOST OCULISTS.

By Floyd B. Ennist, M.D., New York City.

Make arrangements with a doctor near you for a small fee to give your patients the following prescriptions:

1. Cocaine hydrochlorate ..... 3/8 grain
   Homatropine hydrobromate .. .. 1 1/5 grain
   Distilled water to make one drachm.

   Label:—One drop in each eye every seven minutes for one hour, just before first examination of eyes.

2. Eserine sulphate..... 1/4 grain
   Distilled water to make one drachm.

   Label: One drop in each eye every five minutes for four doses, directly after first examination.

The first prescription will do no harm to any eyes except to those with glaucoma. To eliminate the possibility of this disease, find out before using the drops whether the patient has a normal sized field of vision.

When the patient has used the above prescription for one hour, as directed, fit him by the subjective test at 20 feet with the lenses with which he sees the best, remembering that visual acuity is different in different people, according to the distance between the retinal rods and cones in different individuals. Use the second prescription, which in half an hour will bring the eyes back to the normal again.

At the end of four days have the patient return for the post-mydriatic test. For this find the spherical correction by trying each eye separately, adding to the cylinder and axis found at the mydriatic test, the sphere with which the patient sees the best, commencing by subtracting 0.75 S. from the spherical correction found at the mydriatic test, and again test the axis. After finding the lenses with which each eye sees the best and which is the most comfortable, place a lighted candle 20 feet from the patient, and put the Maddox glass rod in the trial frame. By changing the spherical correction, the eyes, in most cases, can be superposed horizontally and vertically, if your work has been done properly, but in some cases prisms must be used for hyperphoria, or prism gymnastics, in exophoria and esophoria (*i.e.*, by increasing the esophoria or exophoria with prisms until the patient sees two candles). Be sure that the superposing correction is perfectly comfortable, and if you cannot find a correction which both superposes and is comfortable, take the one which is comfortable.

Remember that occasionally people have subnormal accommodation as young as nine years old, often long before 40, and therefore sometimes need a different glass for reading and distance.

The above method has been used for several years by a New Jersey optometrist; it conflicts with no existing State laws, will make the refraction work of optometrists more effective than that of most oculists, and will in time compel the latter to do perfect work.

248 West 105th St., New York City.

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"National Eye Hospital."

THE affairs of this Hospital have been commented on more than once in the columns of THE OPHTHALMOSCOPE. Matters have now reached a further stage.

The General Medical Council, upon the complaint of the British Medical Association, have had before them the case of Dr. James Forrest, who was summoned to answer the following charge as formulated by the Council's solicitor:—"That you have associated yourself, as a member of its committee and also as one of its surgeons, with an institution called the 'Eye and Ear Clinique,' and also the 'National Eye Hospital' and the 'National Eye, Ear, Nose, and Throat Hospital,' of 123, Oxford Street, London, W., which advertises by pamphlet and in the public Press for paying patients. And that in relation thereto you have been guilty of infamous conduct in a professional respect." Mr. Smith Whitaker appeared for the British Medical Association, and Mr. Washington for Dr. Forrest. Evidence having been given in support of the charge, Dr. Forrest was called, and said that the Eye and Ear Clinique was an institution which was not established for profit, but for the benefit of people who were not poor enough to attend the ordinary hospitals and not wealthy enough to be attended by Harley Street physicians. He raised no objection to the decision of the committee to advertise the institution, being guided in that decision by the fact that advertisements of hospitals which derived 80 per cent. of their receipts from paying patients constantly appeared in Sunday newspapers. If it were held that an institution of this sort, which sought to be self-supporting, ought not to advertise, he was quite willing to conform to the ruling. He did not think that more than £40 or £50 had been expended in advertisements this year. The money received in fees went for the upkeep of the hospital, and the witness had received no remuneration whatever. The case was eventually adjourned for further evidence to be called on behalf of Dr. Forrest.

At the resumed hearing of the case a letter was read from Dr. Forrest addressed to the Registrar, stating that, the interval of adjournment being so brief, he found it impossible to secure the attendance of any of the committee.

In those circumstances he tendered his resignation of his registration to the Council, and begged that they would direct his name to be erased from the Medical Register. Whatever the verdict of the Council might be with regard to his association with the Eye and Ear Clinique, he had determined to have his name expunged from the Register partly as a protest against the anomalous methods of the British Medical Association and partly owing to the conviction that the diagnosis and treatment of ophthalmic, nasal, and

aural affections would in the near future be undertaken by a distinct body of men in the same manner as the treatment of dental affections.

The case against Mr. Forrest was adjourned to the November session of the Council in order that he might be able to produce further evidence in answer to the charge against him.

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Mr. Thomas Windsor's Estate.

THE late Mr. Thomas Windsor, of Brownlow, Great Budworth, Cheshire, who left property worth £38,162, stated in his will: "I direct my executors to spend as little as they reasonably can on my funeral. I wish no one to be invited and no notice of my death to be inserted in the newspapers. I wish to be cremated, but no extra expense is to be incurred." To his housekeeper, Miss Lily Hargrave, he left £2,000, £250 a year, 500 books, and other effects. His residuary estate, which will apparently amount to about £25,000, he directed should be used as a fund for the relief of suffering, stating that nothing should be given to any hospital, medical institution, church, or charity subject to any particular religious body.

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Cataract Couchers.

APROPOS the communication by R. Ekamabram in the March number of the *Indian Medical Gazette* (for abstract see THE OPHTHALMOSCOPE, June 1910, p. 442), an interesting letter has been published in the May number of the same journal by Lieut.-Col. H. E. Drake-Brockman. It appears that Ekamabram has seen some half-dozen couching operations for cataract by different native quacks. The claim was made that this was the first eye-witness's description of the couchers' operation that had been published. Lieut.-Col. Drake-Brockman, however, draws attention to an article from his pen which was published in the *Transactions* of the Ophthalmological Society of the United Kingdom as long ago as 1895, where he described, from personal knowledge, the steps of the operation as carried out by the native "rawals" or "suttiahs." He also details the campaign he has conducted for years in order to put a stop to the mischief done by that most undesirable class of practitioners.

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Defective Sight in School Children.

AN important letter, signed by Princess Christian and Lady St. Helier, was published early in June appealing to the public for support on behalf of the Association for Supplying Spectacles to Children in Elementary Schools in London. The Association was founded in 1906. The idea is to supply glasses at reduced rates to elementary school children, and in cases of real poverty, to assist in their purchase. Grants have been made only on the recommendation of the teachers of the schools or of the Care Committees. So far the funds have

been adequate to meet the case. But anticipating greater demands upon the resources owing to the arrangement made by the London County Council with certain hospitals for additional medical treatment in eye cases, as shown by the list given below, the Society appeals for additional financial help.

	Cases.
Belgrave Hospital for Children	880
Charing Cross Hospital	1,000
The Hospital for Sick Children, Great Ormond Street ...	440
The London Hospital	3,000
The Royal Eye Hospital	2,000
The Royal London Ophthalmic Hospital	3,000
St. George's Hospital	1,150
St. Mary's Hospital, Paddington	750
Victoria Hospital for Children, Chelsea	440
Queen's Hospital for Children...	350
Guy's Hospital	1,760
Woolwich Medical Treatment Centre, 47, Rectory Place ...	500
Hampstead Public Medical Service	220
Wandsworth Committee of Medical Practitioners	900
Norwood Committee of Medical Practitioners	800
	17,190

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Instruction in Ophthalmology.

AT a meeting of the General Medical Council held on May 26th last, the following report was received from the Examination Committee:—

"That the Examination Committee is of opinion that the Council should recommend to the licensing authorities that there be instruction in ophthalmology, otology, and diseases of the throat, and that every candidate be examined practically in these subjects, and that this resolution should be reported to the General Council."

* * * *

The Examinations of the British Optical Association.

BY invitation, a representative of THE OPHTHALMOSCOPE attended the practical part of the examination for the Dioptric Grade of the British Optical Association's diploma, recently held at the University of London, late Imperial Institute, South Kensington. He was given every facility for inspection. There were forty-five candidates. Upon entering the room every candidate was given a large envelope, which contained three pairs of spectacles, which he was expected to test, and to write a prescription for, as well as to describe the make of the frame. He was then examined practically in the art of straightening crooked frames. After that, he was taken to an optical bench, where he was given five problems to solve. Specimens of the normal eye, displayed under the microscope, next claimed his attention, and furnished a text for questions upon the anatomy of the eye. The preparations, all of which had been made by the optician who presided at this part of the examination, were excellent. The sight-testing part was carried out by subjective methods upon commissionaires, either ametropic or made so artificially by means of glasses. Two eyes belonging to separate individuals were tested by each candidate, and in case of doubt, a third eye was examined. The candidate was expected to

bring his own trial case and frame, as well as to provide his own test-types. Many of the trial-cases were adequate for the most difficult cases.

The questions set in the theoretical part of the examination are appended:

BRITISH OPTICAL ASSOCIATION.

DIOPTRIC GRADE.

LONDON, MANCHESTER, GLASGOW, LEEDS, FRIDAY MORNING, MAY 27th, 1910.

Time allowed, 3 *hours*.

SECTION III. PART A.

Only four *questions to be attempted in part* A.

1. Write a short account of the explanations given of the reflection, refraction, dispersion and polarization of light on the corpuscular and wave theories of light respectively. (30 marks.)

2. Describe carefully the experiments and calculations you would make in order to determine the refractive index of a liquid (30 marks.)

3. Explain by the aid of a diagram the use of an ordinary convex lens as a magnifying glass. (20 marks.)

4. What is a spectrum?

How does the solar spectrum differ from that produced by an intensely luminous block of lime? What explanation is given of this? (30 marks.)

5. State and explain under what circumstances light is totally reflected. (20 marks.)

SECTION III. PART B.

Only two *questions to be attempted in part* B.

6. Why are crown glass and flint glass used in making some bi-focal lenses? (15 marks.)

7. Transpose into spherical-cylinder formulæ

(*a*) —32·5 C cyl. 25°—2·75 D cyl. 115°.
(*b*) + ·75 D cyl. 10°—5·50 D cyl. 100°.
(*c*) —4·50 D cyl. 125°+3·25 D cyl. 35°.

(15 marks.)

8. Name the variations made and the reason for the variation in

(*a*) the joints of a spectacle frame,
(*b*) the eyes of a spectacle frame,
(*c*) the bridge of a spectacle frame,
(*d*) the sides of a spectacle frame. (15 marks.)

SECTION III. PART C.

Only four *questions to be attempted in part* C.

9. What is myopia? How may it be produced by variations in the shape of the eye? (30 marks.)

10. What symptoms usually accompany hypermetropia which would lead you to suspect it? (40 marks.)

11. How with the system you use would you expect to arrive at the following correction: +2 sph.+1 cyl. axis vertical?
(50 marks.)

12. Explain with the aid of a diagram why a small pupil should reduce refraction errors; hence discuss the advantages of a good light for fine work. (40 marks.)

13. Explain with the aid of a careful diagram what is meant by "mixed astigmatism." When a patient is being tested for astigmatism, he may with a given lens say that the line which was his clearest line on a fan has become the worst. Explain this.
(45 marks.)

SECTION III. PART D.

14. What is the iris? What is its structure and uses?
(45 marks.)

15. What is the blind spot? How may its presence be demonstrated in your own eye, and what can you learn from its structure as to what is necessary for sight? (45 marks.)

SECTION III. PART E.

16. Explain clearly and fully the difference between strabismus and paralysis of an ocular-motor muscle, giving the principal clinical points of each condition. What tests can be used to distinguish between the two conditions? (45 marks.)

17. Why and when are stereoscopic exercises used? Explain in what cases such exercises should be given, and why they should not be given in others. Explain thoroughly the principle of the stereoscope when used in such a way. (45 marks.)

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An Optometry Bill Vetoed.

From our contemporary, the *Journal of Ophthalmology and Oto-Laryngology*, we learn that the Optometry Bill, recently passed by the Maryland Legislature, has been vetoed by the Governor.

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The Oxford Ophthalmological Congress.

THE Oxford Ophthalmological Congress will be held on Thursday, July 21st, and Friday, July 22nd next. By the courtesy of the Warden, Keble College has again been placed at the disposal of the Congress. At the inaugural dinner, arranged for the night of Thursday, Sir Anderson Critchett, Bart., C.V.O., will occupy the chair. On Friday night a smoking concert will be held in the junior common room at Keble College. On Saturday morning there will be a launch excursion on the Thames to Reading. Apart from the social element, for which these meetings have always been famous, there will be ample scientific interests. Thus, the opening address will be delivered by Professor William Osler at 10 o'clock on the Thursday morning. He will be followed by Professor Lagrange (Bordeaux), Dr. Holth, (Christiania), Major H. Herbert (Nottingham), and Dr. Freeland Fergus (Glasgow), who will describe the features of their respective operations for glaucoma. In the afternoon Sir Anderson Critchett will operate

for cataract, and will also demonstrate the operation (devised by his father, Mr. George Critchett, many years ago) of iridodesis. Professor Lagrange and Dr. Freeland Fergus will operate on cases of glaucoma. Cyclodialysis will also be demonstrated. On the Friday morning there will be addresses by Professor Poulton and Mr. Priestley Smith, while the afternoon will be devoted to operations for glaucoma by Dr. Holth and Major Herbert, and Major Gidney, I.M.S., will demonstrate 'Jullundur Smith's' intra-capsular operation for cataract.

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Centenary of the Bristol Eye Hospital.

THE Bristol Eye Hospital, founded on June 18th, 1810, at a public meeting of the citizens in the Bristol Guildhall, celebrated its centenary anniversary by holding an open-air carnival from June 15th to 18th, in the Zoological Gardens, Clifton, Bristol. The object of the fête was to raise a sum of money for the enlargement and improvement of the existing buildings, and the fête itself was of proportionate magnitude.

The occasion was taken by Mr. Richardson Cross, senior surgeon to the Hospital for the past 28 years, and to whose skill and energy its present position is due, to issue invitations to his former house surgeons and clinical assistants to dine with him there on the centenary day. Amongst those present were the Lord Mayor of Bristol (Mr C. A. Hayes), Mr. Edmund King (Chairman of Committee of the Hospital), Dr. Tweedy, Mr. Prichard, Mr. Cyril Walker, Mr. Godby Gibbs, and the following house surgeons and clinical assistants: Mr. Alex. Ogilvy (Bristol), Mr. R. J. Coulter (Newport), Mr. H. G. Parker (Bolton), Mr. Bernard Cridland (Wolverhampton), Mr. Thomson Henderson (Nottingham), Mr Russ-Wood (Shrewsbury), Mr. Waugh Young (Edinburgh), Mr. A. L. Fleming and Mr. Wanklin James (Bristol) and Mr. George F. Wallis (Aldershot).

Letters of regret were received from Professor Snellen, of Utrecht, who was the first house surgeon, and from the following: Mr. A. C. Morton (Bristol), Mr. Chetwode Aiken (Truro), Mr. Richard Cruise (London), Mr. Arthur Wood (Hereford), Mr. J. Clayton and I. W. Myler.

Major Kelly, D.S.O., I.M.S., is in India, Mr. George Harty at Wellington, New Zealand.

At the conclusion of the dinner, Dr. Ogilvy, as senior former house surgeon present, proposed the health of Mr. Cross, and paid a high and well-merited tribute to the distinguished ophthalmologist under whose able and kindly teaching they had all so greatly benefited. Mr. Cross duly expressed his appreciation of the trouble his guests had taken to be present from such long distances, and the pleasure it had given him to bring together so many old pupils of the hospital.

* * * *

Belgian Ophthalmological Society.

IN connection with the International Exhibition at Brussels, the Belgian Ophthalmological Society has organized a meeting, which will be held on the 24th and 25th of next September. Communications will be made by Axenfeld, Hess, Hirschberg, Jessop, Landolt, Motais, Straub, and others. Any ophthalmologists who wish to participate in the gathering are requested to notify Professor van Duyse, of Ghent, Belgium, before the 18th of August.

THE

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ORIGINAL COMMUNICATIONS.

THE BACTERIOLOGY OF THE NORMAL CONJUNCTIVA IN ITS RELATION TO INTRA-OCULAR OPERATIONS.*

BY

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IT would be impossible for me to discuss the whole bacteriology of the conjunctiva in one lecture. Therefore I will limit my remarks to the bacteriology of the normal conjunctiva, more especially in relation to ophthalmic operations.

The conjunctiva being a very exposed mucous membrane, it naturally follows that organisms continually gain entrance to the conjunctival sac. So frequently are some of the common organisms found that they may almost be regarded as normal inhabitants. Yet it is wonderful how rarely conjunctival infection takes place.

There are many factors which bring about this natural resistance of the conjunctiva to infection.

First, the lacrymal secretion, although having little or no bactericidal action, keeps the eye cleansed by mechanically washing away the organisms. This is borne out by the fact that after the first two hours following an experimental inoculation of the conjunctiva, no organism can be found until the disease is established.

I have found in the normal conjunctiva that cultivations taken with a platinum loop from the upper and outer fornix remain sterile twice as frequently as those taken from the lower and inner fornix. This, I think, is accounted for by the cleansing of the upper fornix by the tears, the organisms accumulating in the lower *cul-de-sac* towards the inner canthus; indeed, cultivations taken from the neighbourhood of the caruncle rarely remain sterile. This comparative sterility of the upper fornix is an additional reason for making incisions into the globe in an upward direction, whenever possible.

Secondly, the epithelium presents an important barrier to infection; indeed, it has been proved experimentally that such organisms as the tubercle bacillus, staphylococcus, and pneumococcus cannot attack the conjunctiva without a break in the epithelium. Such gaps in the epithelium may be the result of mucoid changes in the cells, a fact which probably helps to account for the comparative frequency of purulent conjunctivitis in the new-born and recurrent attacks in patients, the subjects of other forms of chronic conjunctivitis. The comparatively poor basement membrane of the conjunctiva, as compared with that of the cornea, is no doubt a factor why the conjunctiva is much more frequently infected than the cornea; indeed, the latter may be bathed with pus without infection taking place.

Thirdly, the laxity of the tissue, together with a large blood supply, allows the conjunctiva to be filled with tissue fluids containing protective bodies.

Fourthly, the phagocytosis of the cells forming the lymphoid layer in the conjunctiva offers an additional barrier to infection.

*A lecture delivered on July 16th, 1910, in the Post-Graduate Course of Ophthalmology in the University of Oxford.

The conjunctiva, therefore, is a membrane highly resistant to infective processes, and so virulent organisms are able to remain on its surface without infection taking place.

The bacteriology of the normal conjunctiva has been the subject of an immense amount of experimental investigation, with results which vary enormously as to the percentage of organisms found. The discrepancy in these results depends on several factors. These are :—

(a) The hygienic surroundings of the patient ; that is to say, if the patient be drawn from a class where herding together and dirt are prevalent, or follows an occupation where he is brought in contact with infective material, a higher percentage of organisms will be found in the conjunctival sac.

(b) The media on which the cultivation is made. For this purpose human blood-serum or blood-agar should always be used, since some organisms will grow only on this medium.

(c) The method of obtaining the material for examination.—I have already shown that different parts of the conjunctiva vary in their sterility. The ordinary method of collecting material from the conjunctival sac is to wipe a sterilised platinum loop along the conjunctival fornix and to inoculate the culture media. If this test be used it will be found that only about one-half the cases will grow organisms. If nutrient broth be dropped into the conjunctival sac, pipetted away, and put into a tube containing more of the medium, it will be found that the tubes practically never remain sterile.

From these facts it will be seen that the conjunctiva always contains micro-organisms. The ophthalmic surgeon is therefore always operating in a septic area, and it is probable that every wound which is made into the globe is a septic one in the strictest sense of the word in that it is contaminated with micro-organisms.

In support of this, I have examined a number of cases immediately before operation by taking cultivations from the conjunctival sac, and have grown staphylococcus albus, aureus, and pneumococcus. Although these organisms were present at the time of operation, no sign of inflammation showed itself in the eye subsequently. Unfortunately, this is not always the case, and inflammation may follow operation wounds quite apart from any faulty *technique* on the part of the surgeon.

This depends :—first, on the number, virulence, and nature of the organisms introduced into the globe ; secondly, on the position and nature of the wound. As these factors are, to a certain extent, remediable by the surgeon, I propose to discuss them more fully.

1.—The Number, Virulence, and Nature of the Micro-Organisms.

It has been proved that the *number of organisms* introduced into a wound may be a determining factor in the production of inflammation. It is therefore important to reduce the number of organisms in the conjunctival sac, as far as possible, before performing intra-ocular operations. Constantly washing out the conjunctival sac with a mild antiseptic lotion is the best means of doing this. Although antiseptics cannot be used of sufficient strength to kill the organisms directly, the presence of minute traces of the antiseptic prevent their multiplication, for which reason I think mild antiseptics are better than sterile normal saline solution. A certain number of the organisms already present are also mechanically removed. I have proved over and over again that cultivations taken from the conjunctival sac almost invariably remain sterile after about three days of washing out with 1 in 6,000 perchloride of mercury, or even boric acid, used four times daily, which I think

should be adopted as a matter of routine before any intra-ocular operation is undertaken. The test for sterility by wiping a platinum loop along the conjunctiva, although not scientifically accurate, is excellent to obtain an idea of the number of organisms present. Theoretically, it should be used before every intra-ocular operation; at any rate, it should be carried out if there be any suspicion of a discharge. The test of padding the eye the night before an operation is an extremely bad one, as the closing of the conjunctival sac leads to an increase in the number of organisms. If this test be used, it should only be applied two or three days before the operation. The use of a pad after an operation is essential to keep the eye at rest until the wound is shut off from the conjunctival sac, and reliance must then be placed on frequent bathing of the eye with mild antiseptics to keep down the number of organisms.

Conjunctivitis which sometimes follows on the third or fourth day after operation is no doubt due to the bandaging of the eye, but this rarely gives rise to wound infection, since by that time the wound is usually shut off from the conjunctival sac, provided a good conjunctival flap be obtained.

The virulence of the organism is another important factor in infection. Nearly all the organisms which are found in the so-called normal conjunctiva are comparatively non-virulent, otherwise they would set up a conjunctivitis. It is well-known that the staphylococcus albus and pneumococcus vary enormously in virulence, and that comparatively virulent strains of these may be present. It has been proved that pyogenic organisms do not always cause suppuration, and it probably depends on the virulence of the organism whether a serous, plastic, or suppurative inflammation takes place in the eye which has become infected. Although infections from the streptococcus and other virulent organisms do occur, they are not nearly so frequent as infection from the usual inhabitants of the conjunctival sac.

Organisms which are to be found in the so-called normal conjunctiva.

The two common organisms are the staphylococcus albus and bacillus xerosis. These occur in about 80 per cent. to 90 per cent. of cases. The bacillus Morax-Axenfeld and the pneumococcus occur in about 8 per cent., and, more rarely, the staphylococcus aureus, bacillus subtilis, and streptococcus. Other organisms have been known to occur.

The staphylococcus albus is by far the most common cause of inflammatory trouble after operation in the cases which I have investigated. Of six cases of panophthalmitis following operation, I found this organism in pure cultivation in four, whilst in seven cases of irido-cyclitis following operation, in four this organism was cultivated from the fluid in the anterior chamber. That the organism is not an accidental contamination is also borne out by the fact that three of the cases of irido-cyclitis alluded to, which were vaccinated with the organism in the early stage of the infection, cleared up rapidly.

The view advanced by Axenfeld, that the staphylococcus albus is innocuous, I think is untenable in the case of intra-ocular infection. Apart from the proof offered, it has been shown that the introduction into the eye of pure saphrophytes, such as the bacillus subtilis, and possibly even the xerosis bacillus, neither of which causes any reaction in ordinary tissues, is followed by suppuration. How much more likely is it that an organism which is admittedly pyogenic elsewhere may cause intra-ocular inflammation.

The lesions produced by the staphylococcus in the eye resemble the lesions produced by the organism in the skin, as in acne vulgaris, in that they may

produce either a suppurative or non-suppurative inflammation, according to the resisting power of the patient. In chronic staphylococcal lesions of the skin the organism has been found in the blood without producing much general change, and I would put forward as a possibility that the irido-cyclitis which follows wounds in the globe and gives rise to sympathetic ophthalmitis may sometimes be due to this organism, the onset in the sympathising eye being due to a metastatic deposit of the organism carried from the exciting eye by the blood-stream. The affinity of the organism for tissue similar to that on which it originally grows accounts probably for the selection of the other eye for its growth rather than the other tissues of the body. Much proof is yet wanting by bacteriological examination of the blood and of the exciting and sympathising eyes before this can be established, as the organism is notoriously difficult to find in the tissues.

The pneumococcus is a comparatively common cause of suppuration after operation, but is usually associated with lacrymal obstruction. The 'normal' conjunctiva rarely contains the organism in sufficient numbers or virulence to produce suppuration. When infection occurs, the inflammation is always as a suppurative process.

The streptococcus always causes very acute suppurative inflammation, but its occurrence is rare.

We next come to a group of organisms which, although non-pyogenic in the conjunctiva, have been described as producing suppuration in the globe. They are the bacillus Morax-Axenfeld, bacillus subtilis, and, possibly, the xerosis bacillus.

The bacillus of Morax-Axenfeld is an organism which is non-pyogenic; that is to say, the inflammation which is set up is not a true suppurative process. Infection of the cornea causes a grey, non-purulent ulcer; care must be taken to distinguish it from the hypopyon-ulcer caused by the diplo-bacillus of Petit. No case of wound suppuration has been recorded as due to this organism, and it may therefore probably be regarded as innocuous except that cases of diplo-bacillary conjunctivitis are very frequently contaminated by the staphylococcus.

The bacillus subtilis in the conjunctiva and other tissues of the body is a pure saprophyte, but it does cause suppurative inflammation in the eye when introduced in large quantities into the anterior chamber or the vitreous. If found in the conjunctiva, it must be regarded as dangerous to wounds in the globe. Suppuration has several times been recorded as being due to this organism.

The bacillus xerosis.—The experimental introduction of the bacillus xerosis into the anterior chamber produces no inflammation, but when injected into the vitreous in large numbers, it causes inflammation. It is probable that the organism is practically non-virulent as regards ordinary wounds. At the same time some three or four cases of panophthalmitis have been recorded as due to this organism, and I have myself examined two cases in which this organism alone was obtained from the pus in the vitreous. In both instances the suppurative process was of long duration, and it is possible that the pyogenic organism may have died out.

2.—The position and nature of the wound in the globe.

Having dealt with the organisms commonly found in the normal conjunctiva, I will now pass on to the position and nature of the wounds in the globe as influencing infective processes.

It is obvious that as the ophthalmic surgeon is operating in an area in

which he can never be absolutely sure of his asepsis, the less frequently he makes wounds into the globe, consistently with the general object of the operation, the less the risk of septic complications. For this reason such operations as a preliminary iridectomy and evacuation after needling are to be avoided if there are no other indications calling for their use. As the conjunctiva is not aseptic, instruments which have touched it before being introduced into the interior of the eye, should, as far as possible, be re-sterilised.

I have already pointed out the extreme importance of the rapid shutting off of the wound in the globe from the conjunctiva as the principal safeguard against infection after operations. Hence, in making wounds into the globe, care must be taken to facilitate rapid healing by making the incisions as obliquely as is consistent with the object of the operation, so as to get large surfaces in apposition, and, wherever possible, of obtaining a covering by means of a large conjunctival flap. The importance of avoiding a fistulous opening into the globe as a sequela of prolapse of portions of the uveal tract or lens-capsule, is too well-known to require comment. It is the commonest predisposing cause of intra-ocular inflammation following operation.

At the same time, a fistulous opening may be present in the globe for weeks without any inflammation following. Thus, after the excision of the apex of the cone in conical cornea, the wound may leak for weeks and still the eye remain aseptic. I think that this may be accounted for by the aqueous continually escaping from the wound so keeping it mechanically cleansed, and by the aqueous after evacuation containing the protective bodies which are present in the blood-serum. The absence of protective bodies from the normal aqueous possibly partly accounts for the comparative frequency with which inflammation follows the operation of needling for cataract.

I have shown elsewhere that the presence of blood-clot and probably also soft lens matter facilitate the growth of organisms in a wound. Hence, personally, I am in favour of washing out the anterior chamber after cataract extraction to remove the soft lens matter and blood-clot from the wound as far as possible.

When organisms of a not very virulent nature are introduced into the eye it may depend on what portion of the eye is inoculated whether inflammation takes place or not. Thus, if a non-virulent staphylococcus albus be introduced into the anterior chamber through an open wound it may cause no inflammation, whilst if the same strain be introduced into the vitreous, suppuration is caused thereby. This is also borne out by the fact that after operations which have involved the vitreous, inflammation is a much more frequent sequela. The reason that organisms multiply better in the vitreous seems to be that there is no mechanical action of the aqueous to wash them away, and, at first at any rate, the vitreous does not contain the protective bodies which are present in the aqueous after evacuation.

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A PEDIGREE OF FIVE GENERATIONS OF "BLUE" SCLEROTICS.

BY

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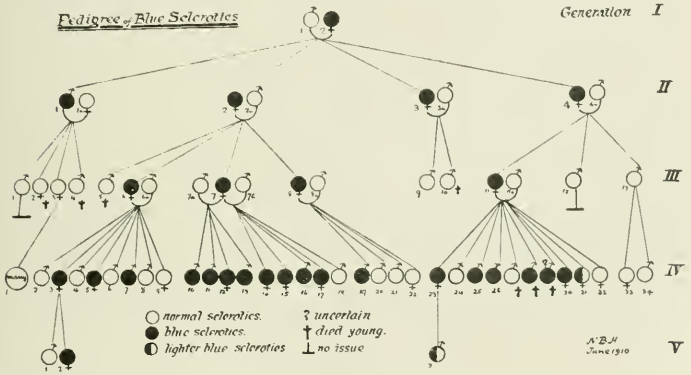
THE pedigree shown in the chart is an extension of one published by Mr. Sydney Stephenson in the May number of THE OPHTHALMOSCOPE, under the title, "A peculiar appearance of the eyes affecting twenty-one members belonging to four generations."

The woman marked Generation III, 2, came under the care of Mr. Treacher Collins, at Moorfields, in February, 1909, on account of presbyopia. The peculiar appearance of the colour of her sclerotics was remarked, and on her statement that several of her family had a similar condition, the case was handed over to me for investigation. Subsequently, I saw other members of the family at Hospital, and visited others at their homes, with the result that a clear inheritance of the peculiarity was found for five generations, three of whom I saw; but the investigation was incomplete owing to my failure to trace the descendants of the woman marked Gen. II., 2, several of



whose children and grandchildren were stated to have the same blue sclerotics. Mr. Stephenson's pedigree made up this deficiency, the description and names given me of this branch of the family tallied with those given in his note, and there could be little doubt that he and I had trace of the same original stock. That this was so has been confirmed by subsequent enquiries. Together, our investigations made up a large pedigree, covering over 55 individuals, of whom 31 are known to have had the same congenital peculiarity.

Of the general features of the condition, I cannot do better than repeat Mr. Stephenson's description of the eyes of the lad whom he first saw:— There was a "curious, uniform, bluish tinge, perhaps best described as 'leaden.' The appearance extended to the cornea, on the one hand, and

beyond the equator of the eyeball, as far as could be seen, on the other. It showed no accentuation in the ciliary region. It was further remarked that the lad was of dark complexion; that a small embryontoxon was present towards the upper margin of each cornea; that the fundi were well pigmented; and, lastly, that the optic discs were of oval shape, and that a congenital crescent (the so-called 'Fuchs' coloboma') was present at the lower margin of each papilla."

In so many cases and with so distant a relationship, it is to be expected that some differences in the appearances should be found. Referring to my notes, I find that in one case the blueness of the sclerotics was found to be much deeper over the ciliary region, and it appeared to be masked towards the equator of the globe by the increased thickness of the overlying conjunctiva. In others a masking of the colour could be noted in those regions where muscle tendons overlay the globe.

The complexion of my patients varied considerably, in some the hair was very dark, in others dull gold and even bright yellow; and there was an equally wide variation in the colour of the irides.

The blue colour of the sclerotics was not equally marked in all cases, in two of the youngest children of my series it was much less deep in tinge, and little deeper than that so commonly seen in small children; these two cases are marked differently in the chart. For the most part these people were healthy, but they were of distinctly small physique. It is noteworthy that in nearly all those subjects in whom the refraction was worked out, a considerable degree of astigmatism was found, the discs were oval and Fuchs' colobomata of the lower edge were found.

Examination of these people inclines me to agree with Peters that the peculiar colour of the sclerotic is due to its unusual thinness. The delicate sclerotic of children very commonly has a bluish tinge, but this is lost with age, and as the tissue becomes thicker or denser. In this family there seems to be no doubt that the colouration is stationary, the woman (III, 11) is sure that those of her children who have blue sclerotics, had the colour at birth, and that it has not changed with age, and she is observant, for she noticed changes in hair colour as her daughters reached puberty. Against the possibility of the colour being due to excessive pigmentation may be set the facts that in dark races the sclerotic is not blue but yellow, and actual pigment patches can be seen on the surface of the sclerotic, particularly about the perforating ciliary vessels; and in two cases recorded by me, in 2 or 3 of the children with excessive pigmentation of one eye, the sclerotic was yellow with patches of brown pigment.

THE GENERATIONS.

Generation I.—(1) A man named Tresadam of whom there is no information; (2) his wife died aged 60, was seen by her granddaughter III, (11) who remembers well the blue colour of the whites of her eyes. She had four children all of whom are reported (to both investigators) to have had the same peculiarity.

Generation II.—(1) Alfred, had blue sclerotics, cannot now be traced, he had four children, two boys and two girls none of whom had the mark, one of these married and had many children all normal. (2) Sophie (Brunt) affected, had four children of whom three were affected; these, their children, and grandchildren, form the main part of Mr. Stephenson's pedigree. (3) Esther, affected, had two children, of whom one is alive unaffected, the other died young. (4) Mrs. Simmonds, died aged 52, affected, had three children of whom the eldest, a girl, is alone affected.

Generation III.—(Affected sibships only detailed.) 5-8 issue of affected mother. (5) Male, died aged 20, not affected, (6) Martha, affected, had eight children, three affected, and 2 grandchildren, one affected. (7) Sophie, affected, married twice, first Englishman, had four affected children; secondly Jew, had five children, four elder affected. (8) Rosie, affected, had four children, eldest only affected.

(11-13) issue of affected mother. (11) Mrs. Barnes, *æt.* 47, slatey-blue sclerotics, dark brown hair, irides slatey-brown with brighter brown pigment around pupillary border. V-6/9, refraction - 0·5 cyl. ax. 0° = 6/6., oval disc, choroid deep red, no pigment ring to discs; early senile lens opacities. (12) male not affected, died of epilepsy, married, no issue. (13) male, not affected, two children, not affected.

Generation IV.—2-9 issue of affected mother, of them Nos. 3 and 5 females, and 7 males are affected; 3 has married and has 2 children, the younger is affected. 10-18 issue of affected mother by two husbands, 10-13 by Englishman, 14-18 by Jew, and all are affected except the youngest No. 18. One of them Mr. Stephenson describes in detail as quoted above, and the refraction is recorded as 1D. sphere c + 2D. cylinder axis 90.

19-20 issue of affected mother, the eldest a boy is alone affected. 23-32 issue of affected mother. 23, female *æt.* 27, very deep slatey-blue sclerotics deepest-colour over ciliary regions, hair dull gold, irides dark green with brown pigment around pupillary border; refraction c + 1D sphere, c + 3D cylinder axis 90°, oval discs, Fuchs' colobomata; choroid red but not darker than non-affected sister's; has one child affected. 24, male, *æt.* 25, not affected, married, no children. 25, male, died *æt.* 21, rheumatic fever, affected. 26, male, *æt.* 23, very blue sclerotics, hair light brown, irides green with yellow pupillary ring, cornea only 10 mm, in diameter, V=6/24, refraction R.—2.5D. cyl. ax. 0.= 6/9, L.—3D. cyl. ax. 160° = 6/9, choroid red, no deep pigmentation, oval discs, Fuchs' colobomata. 27, male died, *æt.* 3½, not affected. 28, male, died *æt.* 1¾, affected. 26, male, died, æt. 1, mother thinks he had blue sclerotics. 30, female, *æt.* 17, blue sclerotics, hair light brown, irides deep blue with yellow pupillary ring, R.V. 6/12 c + 1.5 cyl. = 6/6, L.V. 6/60 c —1D. sph. c—2D. cyl.\ = 6/9, choroid bright red, Fuchs' colobomata. 31. female, *æt.* 14, sclerotics bluer than ordinary, but not so blue as other members of family, hair dark brown, used to be chestnut, irides hazel, refraction R & L—1D. sph. c. + 3D. cyl. | 32, female, *æt.* 9, sclerotics white, hair light brown, irides. blue with soft yellow pupillary ring, refraction R. & L. + 1D. cyl. |.

Generation V.—1 and 2, issue of affected mother; 1 male not affected, 2 female affected; 3, issue of affected mother, male *æt.* 2½, sclerotics blue, but not so deep as his mother's, hair bright yellow, irides blue-gray, refraction could not be ascertained, boy too refractory.

The disproportion of the sexes in the inheritance is worth noting; taking the affected sibships only, there were born 27 males and 22 females; and of the affected 12 are males and 18 females. The fact that the inheritance is always through the females may mean much or little, for it has to be noted that only one affected male has married and had issue, and these children are reported to be unaffected.

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(2) *Trans. Oph. Soc. U.K.*, Vol. XXV, p. 318.
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CLINICAL AND PATHOLOGICAL MEMORANDA.

HYPERNEPHROMA TUMOURS OF BOTH OPTIC NERVES AND HYDROCEPHALUS ASSOCIATED WITH OBESITY AND SIGNS OF PRECOCIOUS DEVELOPMENT.*

BY

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THE patient was a girl, aged four years, who had been hydrocephalic from birth. She was intelligent, but almost blind as the result of advanced primary optic atrophy on both sides. In appearance she resembled a short, stout girl on the eve of puberty, rather than a child aged four. The pelvis and hips were larger and wider than normal for her age. The external genitalia were well developed. The contour of the lower limbs approached the adult type. The breasts, however, were not enlarged, and there was no local or general hirsuties.

She died after an attempt had been made to relieve increasing intra-cranial pressure by puncture of the lateral ventricle.

Post-mortem Examination.—An adrenal tumour (hypernephroma) occupied *the site of the left supra-renal capsule*. It was almost spherical, and measured 1½ inches in diameter. Its structure was that of a fibroma or a fibro-sarcoma. It had a definite capsule in which definite supra-renal elements (cortex) could be seen under the microscope. In some places it consisted of well-formed fibrous tissue of scar-like consistency, whereas elsewhere it was softer and the cells were spindle-shaped. Besides this, there were remarkable giant cells, some of which were as much as 100 μ in diameter. They had one, or more usually several, nuclei, but these had never the arrangement of the nuclei seen in tuberculous giant cells

Examination of Brain.—Advanced internal hydrocephalus was present. A symmetrical tumour occupied the position of the optic chiasma, which it apparently destroyed and replaced. It extended forwards along the optic nerves as far as the optic foramen, where it stopped abruptly. It extended backwards into the crura, and outwards into the region of the Sylvian fissure but its outward and superior limits could not be defined with exactness. It was slightly firmer than normal brain substance, and this was the only criterion by which it could be defined therefrom. Its structure appeared to be that of a glioma, but, on careful search, a very small number of giant cells, similar to those seen in the adrenal tumour, were found, suggesting that the two were in some way related; although which was primary and which secondary, was difficult to say.

The ovaries appeared large for a child of that age, but were normal in structure. The vagina and uterus were normal, as also the pineal and pituitary bodies, thymus and thyroid glands.

The case illustrated the relationship existing between tumours of the adrenal cortex and obesity, with signs of precocious sexual and physical development.

*Case reported at a meeting of the Medical Society of London on Jan. 10th, 1910.

AN UNUSUAL CASE OF DIPHTHERIA OF THE CONJUNCTIVA AND CORNEA.

BY

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As I have pointed out elsewhere (*Trans. Ophthalmological Society U.K.*, Vol. XXII, 1902), cases of mild diphtheria of the conjunctiva are by no means uncommon in London, especially at times when ordinary diphtheria is rife.* Most of these cases are of the kind described by many text-books as instances of so-called "croupous conjunctivitis." On occasion, however, the disease assumes the clinical appearances conventionally associated with typical "diphtheritic conjunctivitis."

The disease may even prove fatal, as in two cases under my own care. In the first of these, the facts of which were reported in the XXII volume of the *Transactions of the Ophthalmological Society* diphtheria of the conjunctiva, became complicated with membrane upon the tonsils, soft palate, and uvula, and the child, a girl aged sixteen months, died eleven days after the commencement of the disease. In cultures made from the conjunctiva there was found: (1) Klebs-Löffler bacilli, and (2) streptococci. In the second fatal case, reported in THE OPHTHALMOSCOPE of August, 1904, the patient, a female child aged nine months, appears to have died from toxæmia induced by conjunctival diphtheria alone, since no membrane could be found in mouth, nose, or fauces. The bacteriological findings included: (1) Klebs-Löffler bacilli; (2) staphylococcus pyogenes albus; and (3) Koch-Weeks' bacilli. The diphtheria bacilli killed a guinea pig in forty-two hours.

The peculiarity of the following case was that the stress of the morbid change fell upon the ocular conjunctiva and the cornea, and not, as is usual, upon the palpebral conjunctiva.

On July 20th, 1907, I was asked to see a small boy, aged about six years, who had been admitted to the Evelina Hospital a few days previously. I found the lad in bed with his face covered with impetiginous sores, and thick pus pouring from his nostrils. The child seemed very ill. The eyelids were not markedly thickened, and they could be everted, although not without some little difficulty. The ocular conjunctiva and the cornea of both eyes were covered with adherent membrane, of ashen-grey colour, so that the entire anterior part of the eye, including the cornea, presented a whitish-grey appearance, almost as though the parts had been cauterized. There was no pronounced enlargement of the preauricular glands. There were patches of membrane in the throat, especially on the right side. In smears taken from membrane from the conjunctiva were found: (1) numerous and typical Klebs-Löffler bacilli, and (2) streptococci. The same organisms were found in cultures, although I cannot now lay hands upon the report furnished by the Hospital Bacteriologist, Dr. A. N. Leathem. Animal inoculation, however, was not carried out.

Antitoxin was injected on two occasions in large doses.

On July 23rd, 1907, the general condition of the child was much better. He was brighter in himself, the sores on the face were drying up, but the

*During a period of five consecutive years among 3,412 eye patients at two hospitals for children there were 43 instances of the disease, or a percentage of 1·26. That number included all kinds of conjunctivitis associated with the Klebs-Löffler bacillus, the presence or absence of which was the criterion of a given case being diphtheritic or otherwise.

nostrils were excoriated. The eyes showed much improvement. R.E.—Lids not much infiltrated, but it was most difficult to evert the upper lid. The ocular conjunctiva was covered with patches of membrane. The cornea, now plainly visible, was staphylomatous. L.E. Upper lid can be everted without difficulty. Patches of membrane on ocular conjunctiva. The cornea is visible now, although membrane still hangs about it. The cornea is, of course, cloudy.

The child, against the advice of the Resident Medical Officer, was taken out of the Hospital by his parents soon after the last note.

NOVELTIES.

A COMPLETE TRIAL CASE.*

BY

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I HAVE long been of opinion that trial cases could be improved in detail in many ways, and I think that the following suggestions might prove of use to the wholesale manufacturers of trial cases, so that they may have an opportunity of knowing what is really required by the medical profession.

1.—The lenses should always be fitted with metal rims with handles, otherwise they get smeared by the fingers. They need not exceed two-thirds of the diameters of the rims, which allows of their being made thinner and lighter, the surrounding interval being filled in with thin metal or vulcanite.

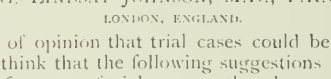

FIG. 1. FIG. 2. FIG. 3. FIG. 4.

2.—The spherical glasses should run in quarters of a diopter up to 4 D. Then in half-diopters to 7 D. From 7 D. in whole diopters to 16 D. or 17 D., after which 18 D. and 20 D. Intermediate numbers such as 0·12 D. and 0·62 D. are not required. The cyls. should run in quarter diopters to 4 D., then in half diopters to 7 D. Prisms are best in the form of prism diopters, and should be in *pairs* up to 6 Δ. Then one of 7 Δ, 8 Δ, 10 Δ, 12 Δ, 15 Δ, 20 Δ.

3.—In order to differentiate the lenses, the concave sphs. and cylinders should have nickelled or silvered rims. The convex glasses should be left in brass or gilt.

The handles should be in the forms shown in figs. 1–4. If this is done, no mistake is possible, and the refractionist will not have to search for a missing glass, due to its being inserted in the wrong set.

As regards the prisms, the glasses should always have their axes very clearly marked fig. 5 with well-defined *deeply-cut horizontal lines.*

The cyls. should be frosted above and below, and the axis *clearly* marked (fig. 6) as in the case of prisms. This is usually only imperfectly done, and often not at all. They should fit loosely in the rims, so that they may be rotated if necessary. Otherwise, the handles may prevent their being inserted in the frame slots at the correct angle.

* Reprinted (with additions) from the *Optician and Photographic Trade Journal.*

4.—The neutral tint glasses should be in ten shades, marked 1 to 10, each connective number having as many times the intensity (opacity) of the first one as the number indicates. Thus, shade 3 is equivalent to three No. 1 glasses superimposed, No. 10 to ten glasses of No. 1 superimposed. If in rims they should be distinguished from other glasses by having a different colour for the handle, preferably black, and the shade numbers marked in white on the handles.

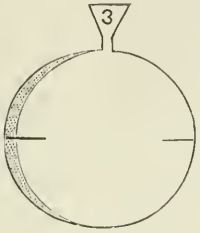

FIG. 5.

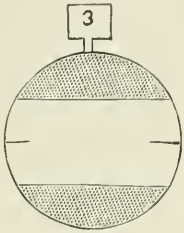

FIG. 6.

5.—Four frames *without sides* containing + 0.5 D. Sph. R. and L., + 1 D. Sph. R. and L., and — 0·5 D. Sph. R. and L. and — 1 D. Sph. R. and L. respectively are most useful and should be kept in the front recess of the case. They are alternately held in front of the patient's eyes to see whether any slight addition or substraction of 0·5 or 1 D. improves the vision for a given distance.

6.—Two trial frames should always be kept in the front recess, as one pair may readily get broken during an examination, as I have found to my cost.

The trial frames should be fitted with a bridge which can be raised and lowered by a screw. The lens-rings should be capable of independent adjustment laterally by means of a double screw thread. Some frames have light vulcanite screens which can be hinged over the R. or L. eye at pleasure. These save time, but add to the weight. If made very light, they form an improvement. In any case the frames should be made as *light as possible*, and the rings should be so constructed that the spheres *drop* in from above and never from below, as they inconvenience the patient when being pushed up, and jerk the face in a disagreeable manner. Every part should be made of aluminium or vulcanite where possible, to reduce the weight.

The side frames should not be bent down at the ends, as they are apt, in the case of ladies, to disarrange the hair; but they should be strong and bent inwards slightly towards the middle line and be furnished with a bean-shaped swelling at the end. This will hold quite well against the sides of the head.

FIG. 7.

In the case of children, either the sides should have stiff curled sliding sides, or they may be dispensed with, and a form of frame made having a strong spring attached to the centre of the frame which curls over the head and ends in a bob just above the child's neck. This holds the frame well, and possesses

the great advantage that the frame does not depend upon the bridge of the nose for support, which, as everyone knows, is often very imperfectly developed in the child, and ordinary trial frames, unless provided with stiff curled sides will not keep on.

The cyls. should be held in place by a light spring above and should fall into a slot attached to a light ring which can be rotated by a small handle attached or by a cogged wheel or worm. The graduations in degrees are best engraved on the half-circles attached to the lower halves of the rims.

7.—A piece of vulcanite or celluloid of any colour attached to a handle (fig. 7) is very useful momentarily to cover up one eye, especially to observe whether both eyes are acting together.

8.—As accessories, the following are useful: (*a*) Two vulcanite opaque discs (*b*) A red and also a clear glass Maddox rod. (*c*) A biprism. (*d*) Three shades of Euphos glass graduated in intensity in the same way as the neutral tint glasses above mentioned, a ruby-red and deep green glass. A pair of spectrum blue glasses, and a translucent ground glass disc for observing slight deviations.

9.—Lastly, the trial case should be fitted with a drawer to contain test types, wool cards, astigmatic charts, stereoscopic pictures, and the like.

TRANSLATION.

ON A CASE OF CONJUNCTIVITIS PETRIFICANS.*

BY
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AFTER mentioning that the patient was a trachomatous man, aged 26, whose upper retrotarsal folds had been excised by another surgeon, Peretz continues as follows :—

"At my examination I found in both eyes a trachoma in process of cicatrization. But what struck me most forcibly was the presence of a large calcareous focus in the left upper palpebral conjunctiva. This more or less rectangular area, 20 millimetres long by about 4 millimetres broad, involved the region of the fornix. It was chalky-white, dry, finely grained, and crystallized ; in level it hardly rose above that of the surrounding conjunctiva. Though not overlapped by this membrane, it appeared to be deeply placed, and to adhere strongly to it. With difficulty I managed to crumble in places the surface of this calcareous mass, by scraping it. At many points the underlying tissue bled at the lightest touch.

The remainder of the conjunctiva presented very little reaction. There were slight hyperæmia around the calcareous spot and a little secretion. The eyeball was injected and the cornea vascularized and hazy. The subjective symptoms were confined to a mere sensation of discomfort under the eyelid. No pain, spontaneous or otherwise. Vision quantitative and tension normal.

The fellow-eye showed nothing special beyond old trachomatous lesions. V counting fingers at 1 metre.

After trying the classical remedies, without result, I went on to quite a different treatment, which consisted in painting the spot twice daily with a one in forty solution of benzoate of lithium. This treatment, to which I shall presently return, was very efficacious from the commencement.

*Abridged translation from *Revue Générale d'Ophtalmologie*, 30 avril, 1910.

On the 1st October, after the fourth painting, the calcareous spot, which previously had a uniform surface, now showed several small losses of substance. At these points the exposed conjunctival mucosa appeared to be ulcerated, and a false membrane lay over all. The rest of the conjunctiva was moderately inflamed, and there was a germ-free secretion. The patient had no pain. On the same day I noted the appearance of a white calcareous point under the upper palpebral mucosa of the right eye, which hitherto had been free. While carefully watching this new morbid process in the right eye, I restricted the treatment to the eye originally affected.

On the 3rd October :—*Left Eye.* The breaking up of the calcareous mass is very marked. Conjunctival inflammation increased and secretion more abundant. *Right Eye.* Enlargement of the calcareous point, which is in the shape of a triangle with a 2 millimetre base. No irritation.

On the 5th October :—*Left Eye.* Manifest tendency to cure. The original focus is now formed only of little calcareous islands of yellowish colour which crumble readily. The denuded areas are numerous and join one with another. The older of these are taking on a normal conjunctival appearance. There is still a false membrane over all. *Right Eye.* Fresh calcareous patch under the first. Both are conjunctival and measure about 3 millimetres. The painting with benzoate of lithium is continued in the left eye only.

On the 9th October, the resorption of the calcareous mass (left eye) was completed. Its site was smooth, red, and looked like a punched-out ulcer. Its edges were perpendicular and indurated. The inflammation and secretion became less after cauterization with silver nitrate. As regards the right eye, the two calcareous islets were stationary, but they also disappeared after a few applications of benzoate of lithium. The patient returned, however, on 25th October, with a calcareous spot of one millimetre diameter on the plica semilunaris. This disappeared without treatment. At this date the morbid process appeared to be definitely at an end. The eyelids appeared normal. The tarsal conjunctivæ were slightly more vascular than the normal. The corneæ were clearing to such an extent that the patient was able to resume work at the end of December. V. R. = 0·1, V.L. = counting fingers at 5 millimetres (*sic*)."

In the remainder of the article the author points out that the case belongs to the class described by Leber as *conjunctivitis petrificans*, that the onset was insidious, since the condition was fully developed when the patient came for treatment, and that no special ætiological factor could be discovered. The mass was composed of phosphate and carbonate of lime, and when parts of it were placed in a solution of benzoate of lithium they were completely dissolved. Reference is made to the use of this salt by Mazet in the treatment of corneal opacities. The following bibliography is given by Peretz :

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ERNEST THOMSON.

REVIEW.

THE ÆTIOLOGY OF TRACHOMA.

BY

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ST. LOUIS, MO., U.S.A.

THE discovery of the so called "trachoma bodies," which are claimed by their discoverers, Halberstädter and Prowazek, and Greeff to be the causative agents in this disease, has initiated general discussion on the subject of the ætiology of trachoma

Eaton[1], in a paper of a highly speculative character, claims that trachoma is primarily an infection of the blood by organisms which are "protoplasmic bodies." They are of two kinds, exogenous and endogenous, and enter the circulation through the palpebral conjunctiva. The life-cycle of the exogenous parasite is completed in the blood and tissues of certain animals and birds, and is carried to the human conjunctiva by the legs, bodies, etc., of insects. The endogenous parasite is infective from one human being to another. Trachoma is found in two forms, clinically indistinguishable, but biologically different. The "contagious" form is caused by the endogenous parasite, the non-contagious form by the exogenous parasite. There is a cachexia from blood infection. The principles contained in the theory of opsonins should be successful in the prevention, treatment, and cure of both forms of the disease. When the granulations appear near the surface, the usual local remedies may suffice, but when thus apparently cured, the disease may recur unless the protoplasmic bodies in the blood are destroyed.

R. Greeff[2] claims that his original observations of the morbid agents of trachoma have been substantiated by later observations. They consist of very regular round bodies, smaller than the smallest cocci. They stain violet or red by Giemsa's method, slightly with aniline colors, but not according to Gram. Under highest magnification, they appear slightly oval, and surrounded by a light halo or mantle. They must not be confounded with eosinophile granules. In later stages they occur heaped up within the cells. Greeff found them in the follicles, extra- and intra-cellular in the epithelium, and free in the secretion. Only fresh cases show the cocci, as treatment with copper sulphate tends to remove them from the surface.

The following method is recommended.—The secretion or epithelium is picked up on a platinum loop, spread very thinly on a cover-glass, dried, and fixed in absolute alcohol for 30 minutes. The cover-glass is immersed for six to nine hours in the stain, which consists of 12 parts of Giemsa eosin solution, three parts of Azur I, and three parts of Azur II. These reagents must be thoroughly mixed and warmed to 37° C. After the staining, the cover-glasses are irrigated with distilled water and dried with blotting paper.

Halberstädter and von Prowazek[3] claim priority in the discovery of the epithelial enclosures in trachoma, and point out the fact that their papers appeared two years previous to Greeff's.

Finlay and Cartaya[4] quote Greeff's description of the cycle of the parasite, as follows: "At first it appears in the shape of small, well-stained granulations, grouped in pairs, within the cell protoplasm and surrounded by a clear zone; later, near the nucleus some reaction products appear; later on a conglomerate mass is formed surrounded by the clear zone, close to the cell nucleus. The

mass grows larger and larger, the clear zone gradually disappears, until the whole of the protoplasm is invaded, the cell then ruptures and the granules are set free."

In cases of typical trachoma, the writers found all the forms described by Greeff. The number of bodies was small in a mild case. They were found in the epithelial cells, leucocytes, "corpuscular" cells (the nature of which is uncertain), in cellular *detritus* proceeding from these cells, and free among the cells. In most of the cases the material was got by expression of the follicles, but good results were obtained from surface preparations. They are best observed in epithelial and epithelioid cells.

Pusey[5] epitomizes the important facts with regard to the trachoma bodies as follows.—(1) They can be found wherever trachoma occurs. (2) They are most readily found in acute cases and at the beginning of the disease. (3) They cannot be demonstrated except in conjunctivæ affected with trachoma. (4) They can be found not only in human trachoma, but also in the conjunctiva of apes experimentally affected with the disease.

McKee[6] examined 8 cases of active trachoma and in 7 found the Prowazek bodies. His method follows.- Conjunctival scrapings were smeared over slides, air-dried, fixed in absolute alcohol for ten minutes, and stained for 20 minutes with the new Giemsa stain, to one drop of which 15 of distilled water were added. The microscopic pictures were typical. In one case slides prepared on the seventh day showed larger bodies than slides prepared on the first day. In two cases the halo forms were found in the initial slides.

McNab[7] states that peculiar granules, not easily demonstrated, have been observed in certain cells from trachomatous conjunctivæ and also from some discharges emanating from non-trachomatous conjunctivæ, when stained in the same way. It is still uncertain whether there exists an arrangement and staining of the granules peculiar to trachoma. The evidence available at present is in favour of a connection between certain granular bodies in the cells, on the one hand, and the presence of trachoma, on the other. The typical Prowazek body consists of a mass of granules in the form of a cap near the nucleus, but separated from it by a clear space.

Stanculeanu[8] fixes the scrapings spread on a slide in methylic alcohol and stains for 20 minutes in a mixture of 1 c.c. Leishmann and 2 c.c. of a 1 to 40 mixture of glycerine and water. Cells containing blue—or purple—staining spherical or ovular formations were found among the epithelial cells in all cases of acute trachoma. As a rule, a single group of granules was situated next the nucleus. When two such groups existed they were at opposite nuclear poles. In the epithelial cells the author noted prolongations of granulations next to the nucleus. Other cells, no longer with distinct limits, were filled with granulations Other types of conjunctivitis yielded negative results. Similar granulations were found in chalazia, but they did not tend to group-formation.

Radziczski[9] embedded in paraffin deeply excised portions of trachomatous conjunctivæ, and found that with Giemsa's stain and a modification of Haidenhain's method, the trachoma bodies were demonstrable in the deeper tissue sections. Wolfrum[10] confirms the presence of Halberstädter-Prowazek bodies in the epithelium of the trachomatous conjunctiva. He found them not only in scrapings, but also in sections of the upper fornix, after the specimen had been fixed in sublimate-formol. In the author's opinion, the absence of the bodies from the subepithelial tissue does not speak against their ætiological importance.

Werner[11] carefully examined a large number of preparations from fresh

trachoma cases and other varieties of conjunctivitis, using Greeff's modification of Giemsa's stain. In all examples of early trachoma he found the cell inclusions and in many patients whose trachoma was no longer fresh and had been treated, he also detected them in smaller numbers. They were absent from cicatricial trachoma, and from all other varieties of conjunctivitis.

One of the drawbacks to rapid diagnosis has been the rather tedious staining *technique*. Verhoeff[12] contributes the following method "while the patient waits." Specimens are obtained by scraping the cocainized conjunctiva with one edge of a cover-glass. This is diluted with tears, spread upon the surface of other cover-glasses, and allowed to dry in the air. Wright's modification of Leishman's stain is allowed to act for one minute. Distilled water is then added until a slight scum is formed upon the surface of the liquid, which is allowed to remain for 3 or 4 minutes. The preparations are then differentiated by washing away the staining mixture with distilled water and by allowing the water to act for one minute.

Schmidt-Rimpler[13] declares that the part the trachoma bodies play in the ætiology of the disease must be decided from the results obtained from inoculations made with pure culture material. Until these bodies are isolated and cultures made and inoculations are followed by true trachoma, there will always remain a doubt as to whether they stand in true ætiologic relation to the disease.

Reis[14] investigated 80 cases of trachoma at various stages and 20 cases of other forms of conjunctivitis. In only two cases—one of acute trachoma, the other of papillary hypertrophy with granuloma—was he able to find the v. Prowazek bodies. Reis also expressed doubt as to their being the active disease producers, and ventures the opinion that they may be reactive products.

Stimulated by Stargardt's and Heymann's finding of epithelial inclusions in certain cases of ophthalmia neonatorum, Halberstädter and v. Prowazek[15] undertook the examination of secretion from thirty-five recent cases of gonococcal urethritis, twenty cases of chronic urethritis (in which gonococci had been previously found), ten recent cases of gonorrhœa of the cervix and urethra in women and fifteen cases with chronic discharge subsequent to a demonstrated gonococcal infection—in other words, in cases all of which were definitely of gonococcal origin. In not a single instance were they able to demonstrate epithelial inclusions. Examination of secretion from fresh and treated gonococcal ophthalmia neonatorum also yielded negative results. The authors then examined secretions from a number of cases of infantile ophthalmia (the disease developing on the sixth or seventh day *post-partum*) of non-gonococcal origin, and found many of the cells with granular masses closely resembling those of trachoma. Indeed, the resemblance was so close that the authors were unable to point to any certain differences, a fact which is not surprising when one considers the difficulty of differentiating between closely-allied protozoa. They arrive at the conclusion that epithelial inclusions may be a constant finding in certain non-gonococcal ophthalmias of the new-born.

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(8) **Stanculeanu.**—Trachoma : A contribution to the study of its ætiology. THE OPHTHALMOSCOPE, 1900, p. 395.
(9) **Radziezski.** Trachoma bodies in the deeper conjunctival tissue *Woch. f. Ther. u. Hyg. d. Aug.*, August 19, 1909.
(10) **Wolfrum.**—Trachoma findings in smears and sections. *Klin. Monatsbl. f. Augenh.*, Oktober, 1909. For abstract see THE OPHTHALMOSCOPE, 1910, p. 38.
(11) **Werner.**—A contribution to the question of the cause of trachoma. *Zeitschrift. f. Augenh.*, Oktober, 1909.
(12) **Verhoeff.**—A rapid method of staining the trachoma bodies of Halberstaedter and von Prowazek. *Ophthalmic Record*, October, 1909.
(13) **Schmidt-Rimpler.**—Has the cause of trachoma been discovered ? *Muench. med. Woch.*, August 3, 1909.
(14) **Reis.**—Concerning the ætiology of the so-called trachoma bodies from the standpoint of investigation to date. *Wiener. klin. Woch.*, Juni 24, 1909.
(15) **Halberstaedter and v. Prowazek.**—On the finding of Chlamydozoa in non-gonococcal ophthalmia neonatorum. *Berliner klin. Woch.*, Oktober 18, 1909. For translation, see THE OPHTHALMOSCOPE, May, 1910.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract

I.—COLOUR SENSATIONS, NORMAL AND ABNORMAL.

(1) **Hilbert, R.—Pathological colour sensations.** (Zur Kenntniss der Pathologischen Farben-Empfindungen.) *Centralbl. f. prakt. Augenheilk.*, Februar, 1910.

(2) **Köllner, H.—Contributions to the pathology of the colour sense. On the differentiation of acquired green-blindness from congenital protanopia and deuteranopia.** *Zeitschrift für Augenheilkunde*, Februar, 1910.

(3) **Fergus, Freeland.—Colour perception and other visual functions in their practical aspects.** *Glasgow Medical Journal*, June, 1910.

(1) **Hilbert** has five interesting cases of pathological colour sensations, and in each there is a different ætiological factor.

The first case, a woman of 30, had for about a week a failure of vision in the right eye, and at the same time the appearance of two oval spots, green in colour, to the outer side of the field. On examination fine vitreous opacities were seen. She improved under treatment, and the coloured spots disappeared.

The second case, a medical man of middle-age, after a few days of severe exertion, lay down on a sofa to rest, and on awakening, found all objects surrounded by a violet contour. This lasted for two or three minutes, and then disappeared. The eyes were quite normal. The author had one similar experience himself, when the contour was of a carmine-red colour.

The third case was that of a boy, aged 12, who suffered, in common with the whole household, from mushroom poisoning. The boy, who had partaken most, was maniacal for four days, and then saw everything intensely yellow for nearly a fortnight.

The fourth case was caused by an overdose of santonin, when everything was coloured green.

The fifth case was a woman, aged 32 years, in the sixth month of her third pregnancy. She complained of a yellow spot before the left eye, and on examination she was found to have a hæmorrhage at the macula, and to be

suffering from nephritis; she had a miscarriage a fortnight later, and in the following year she died from nephritis in the course of another pregnancy, during which she also had yellow vision.

A sixth case is referred to, reported by Yamaguchi in the *Klinische Monatsblatter fur Augenheilkunde*, August, 1909. It occurred in a man, 36 years of age, who suffered from albuminuric retinitis and nephritis, who first had brown vision. Later, he had metamorphopsia and red, and then green, vision, and these were varied so that in a room generally he saw red, and out-of-doors generally green.

This series of cases shows how varied may be the causes of coloured vision. Other causes will occur readily to everyone, but the underlying physiological and chemical changes are quite unknown. A. LEVY.

(2) This paper is one of a series of "contributions" which **Köllner**, of Berlin, has contributed to the *Zeitschrift*. He distinguishes (with v. Kries) two forms of congenital red-green blindness which he calls *protanopia* and *deuteranopia*. In both groups only two colour values are appreciated, a warm hue which is yellow, and a cold which corresponds to blue. The protanope sees a spectral light which a normal individual calls red, as a very dark colour, in fact almost black The long wave length rays have for him a very slight power of exciting the light sensation. The protanope is, in other words, what Edridge-Green would call a *dichromic*, with shortening of the red end of the spectrum. The deuteranope is an ordinary dichromic. Acquired red-green blindness is only a stage in the deterioration of the colour sense from the normal to complete colour blindness, and eventual loss of sight. The cases can, to a certain extent, be grouped as protanopes and deuteranopes, but it is impossible to draw a sharp line of demarkation as in the congenital form. All three are, according to the laws of colour mixture "dichromatic colour systems." Acquired red-green blindness is neither identical with protanopia nor with deuteranopia and can generally be positively separated from them.

Köllner shows how in most cases examination with Nagel's anomaloscope suffices to separate the two classes of defect.

This part of the paper hardly lends itself to abstraction, and the reader is referred to the original. T. HARRISON BUTLER.

(3) The main argument developed in this interesting article, by **Fergus**, of Glasgow, is that colour vision tests, as required by the Board of Trade, ought to be practical and not theoretical in character. The question should be, not whether a man is or is not colour blind, but whether he can distinguish red, green, and white lights at sea. It is remarkable that the article does not seem to deal with railway conditions at all. This is no doubt accounted for by the fact that the author is a practical navigator himself. The subject is one of such importance that the position taken up by Fergus may be illustrated by actual quotations from his article.

"Our contention is that so long as a man can infallibly, and in all conditions of weather, identify a mast-head light, a port light, and a starboard light, he is quite safe for purposes of navigation. . . . . It is not a laboratory experiment . . . . . but it is a question as to whether a man can determine three different lights, namely, red, green, and clear. Supposing a candidate were required to distinguish three different notes as to pitch, such as a high note, a low note, and one about half way between the two, would it be reasonable to ask him to have the knowledge of tone which is requisite to tune a violin?" After quoting Dr. Burch's observations on Artificial Temporary Colour-Blindness (*Journal of Physiology*, Vol XXII) the writer continues:—

"The whole question, then, of colour perception seems at present undetermined, and we cannot but regret that so eminent an authority as a Committee of the Royal Society of London, should have issued a report involving the most serious consequences to a number of seafaring men, on a theory of color perception which is at best a mere supposition, and one which, if Dr. Burch's experiments are reliable, and there is no reason to doubt it, is erroneous."

Fergus then refers to the fact that there is no record of disasters such as should have occurred in the past, on the assumption that 4 or 5 per cent. of men are colour-blind. "We wish distinctly to say that a man who even hesitates as regards the recognition of coloured lights is a danger to navigation. . . . But the thing we wish to insist upon is that a very large number of persons who are congenitally colour-blind are perfectly able, and that without the slightest hesitation, to distinguish the three sensations given to them by red, green, and clear lights. Probably all congenitally colour-blind people have this power so long as their light-sense is good." The writer, after recognising the value of Grossmann's test lamp in practical testing, goes on to discuss the relationship between colour sense, light sense and form sense, and, in particular, the danger which may arise from a deficiency in the light sense, which latter is not required to be tested by the Board of Trade. The remainder of the article seems to deviate somewhat from the main theme, and is concerned with amblyopia ex anopsia. The foregoing quotation, has been given from Furgus's article because it seems to present an extremely practical view of a difficult and much-debated subject, by a man who is acquainted with the practical requirements under working conditions at sea.

ERNEST THOMSON.

II.—POST-OPERATIVE INFECTIONS OF THE EYES.

(1) **Angelucci, Arnaldo.—On post-operative ocular inflammation set up or fostered by auto-infection.** (**Sulle flogosi oculari post-operative provocate o favorite da auto-infezioni.**) *Archivio di Ottalmologia*, April, 1910.

(2) **Morax, V.—The ætiology of late and post-operative eye infections.** *Canada Lancet*, May, 1910.

(1) In this short paper **Angelucci**, of Naples, gives us food for consideration and investigation as there is much that is of the first importance brought up before us in regard to the preparation of the patient for operation, and also in regard to the selection of the time at which it is wise to perform an operation. The subject is not, of course, new, but it is put in a modern way, and shows reason for the procedure of the older school of oculists in paying more attention to the condition of the patient before undertaking any operative procedure which could be conveniently postponed.

It may be assumed, as admitted, that the presence of toxic substances in the blood can account for the occurrence of intra-ocular inflammatory affections, and Angelucci considers it probable that the diffusion of these substances is subject to the same laws as is the diffusion of other substances, such as solution of fluorescein when injected subcutaneously. These same laws may be subject to alteration in consequence of two considerations:—(1) an abnormal condition of the general state, and (2) an abnormal state of the part

The author then proceeds to show how, in his experience, abnormal conditions of the general state, which are produced by profound lesions of large organs, do give rise to alteration of the rapidity with which fluids (as fluorescein) are diffused throughout the body.

He has been able, by experiment, to show that removal of the superior cervical ganglion from a rabbit was followed by more rapid diffusion than in control animals. Conversely, excitation of the sympathetic in the neck lowered the rate of diffusion. Removal of the pancreas gave rise to increased flow of intraocular fluids.

In abnormal states of the local tissues it is shown that there is considerable alteration of the rate of diffusibility. As regards the eye, fluorescein passes into the vitreous with much greater rapidity after severe mechanical injuries and after burns than under normal conditions. After perforation of the cornea, the rapidity of flow is at its maximum.

It is evident, then, that the eye may be, in consequence of some general toxæmia, more than usually liable to inflammatory action, and that, if when in this state it is subjected to operative interference, it is still more liable to go wrong in spite of the most rigorous aseptic precautions.

Thus, after operation on a case of a patient suffering from chronic nephritis or diabetes, iritis, or irido-cyclitis is a frequent result. In cases where the teeth are in bad condition, there may be more or less toxæmia, and in consequence, inflammatory reaction in the eye after operative interference. Similarly, when there is habitual constipation or other disorder of the intestinal tract, chronic catarrh of the bladder, or any condition in which there may be toxæmia, the results after operation may suffer.

It is manifest that it devolves upon the surgeon to take these matters into consideration before operations, and to have suitable treatment carried out in each case, so as to secure the best possible result. Vaccine therapy in furunculosis, influenza, etc., according to the writer, has been of great assistance in this manner. The careful attention to the state of the teeth and state of the mouth may prevent the loss of an eye in certain cases.

In dealing with hospital cases, this "counsel of perfection" cannot always be carried out, but it is easy to make sure that habitual constipation is overcome by the use of some remedy like magnesium sulphate with quinine for a week or two before operation, as our predecessors did.

LESLIE BUCHANAN.

(2) Under the name "late post-operative infections" are comprised all those cases which appear from the third to the fourth day. There are three types of such infections. First, those which are attended by a reopening of the wound; second, those which develop without reopening of the wound: and, third, those which occur with a fistula of the wound.

This paper deals with those under the second head, especially those which develop without apparent opening of the wound, which comprise the greater number of cases. The clinical evolution of these complications allows one to subdivide them into three groups: 1st, irido-cyclitis arising late with the evolution of benign symptoms; 2nd, severe irido-cyclitis which may give rise to sympathetic ophthalmia, and 3rd, a form attended by intra ocular hæmorrhages appearing late.

The ætiology of these irido-cyclitis cases is still hypothetical. The mildness of the symptoms, their aggravation by all intervention, do not permit the determination of microbic infection. **Morax**, of Paris, discusses the *rôle* played by the saprophytes, sporulated micro-organisms which have been accused of causing these complications. He is forced to admit the conjunctival origin of the infection because of the fact, frequently established, that these

complications repeatedly arise in the same subjects after fresh intervention, but he attributes the infection, which appears only after a more or less prolonged period, to a micro-organism which is not yet known. He holds the same view with regard to irido-cyclitis which gives rise to sympathetic ophthalmia. A certain number of cases of malignant irido-cyclitis can be studied from the bacteriological point of view. Here the infectious nature of the complication is demonstrated by finding in the pus various pathogenic microbes, for example, staphylococcus, pneumococcus, and the bacillus of Pfeiffer. The reason of the subacute evolution escapes us. Have we to do with an exogenous or with an endogenous infection ?

Without denying the possibility of a metastatic infection in an operated patient, it is possible that this localization of infection is exceptional, and that more often an exogenous post-operative infection is the cause of the symptoms. It does not appear in the chronic experimental infections that the traumatism has a manifest localizing action.

In post-operative infections with fistulization of the wound, it has been demonstrated that tags of iris and capsule present obstacles to the perfect reunion of the wound, and that fistulization is facilitated by the rupture of the epithelial layers, thus permitting the entrance of pathogenic organisms from the conjunctival sac, especially the pneumococcus and streptococcus.

G. STERLING RYERSON.

III.—TUMOURS OF THE PITUITARY BODY.

(1) **Shoemaker, William T.—Adenocarcinoma of the pituitary body. Report of a case under observation for four and a half years. Pathological examination.** *Trans. American Ophthalmological Society*, Vol. XII, Part I, 1909, p. 173.

(2) **Shoemaker, J. F.—Tumour of the pituitary body.** *American Journal of Ophthalmology*, December, 1909.

(3) **de Lapersonne and Cantonnet.—Visual affections caused by tumours of the hypophysis without acromegaly. (Troubles visuels produits par les tumeurs de l'hypophyse sans acromégalie.)** *Archives d'Ophtalmologie*, février, 1910.

(1) After describing briefly the characteristics of hypophyseal tumours in general, **Shoemaker**, of Philadelphia, reports the following case :

A female, aged 35 years, complained of recent pain in her left eye, the sight of which had been failing for a year. Headache, vertigo, and occasional paroxysms of vomiting were associated symptoms. *Upon examination.*—The left eye was slightly protuberant, and its movements in the temporal direction were defective. Sight was reduced to the counting of fingers at 20 cm. The optic disc was atrophic. The retinal veins were large but not tortuous. The sight of the right eye was 5/7½. The right optic disc was swollen (2·0 D.), and the retinal arteries and veins were tortuous. Both visual fields showed temporal hemianopsia, typical in the right eye and atypical in the left eye.

The patient died upwards of four years after she was first seen by Shoemaker. At the autopsy, a pinkish-yellow tumour of soft and spongy consistence was found adherent to and growing into the base of the skull in the middle fossa. After removal of the brain, it was found to measure 5 cm. in length, and 3 cm. in width. The sella turcica, and the body and wings of the sphenoid were eroded, and upon the left side the sphenoidal and ethmoidal cells were opened up, and the growth extended as far as the soft part of the nasopharyngeal wall. The optic nerve and the nerves leading to the sphenoidal fissure on the left side appeared to be involved. Histological examination showed that the growth was an adenocarcinoma.

SYDNEY STEPHENSON.

(2) This interesting and rare case by **Shoemaker**, in which a diagnosis was made of a growth either arising from or involving the pituitary body, is worthy of full notice :

A female, aged 23 years, with negative family history, consulted Shoemaker on account of loss of vision for eight months. She had had headaches after going to school, had suffered from measles, severe diphtheria, from the latter of which and its paralytic sequelæ she completely recovered. Menstruation began at 14 years and ceased at 16 years. In January, 1908, *i.e.*, eight months before the consultation, she first noticed that vision in the right eye was confined to a small part of the temporal half of the field. Five months later the vision of the left eye began to fail in the temporal half of the field, *i.e.*, according to the patient's statement there was homonymous hemianopsia. When examined, the patient was pale and anæmic, but otherwise seemed well nourished. Pain through right temple at times. No other pain. There was no vision with the right eye; fingers at five feet with the left eye. Pupil reaction in right *nil*, in left, feeble: pupils 5 mm. Media clear, complete atrophy of right, and well-marked atrophy of left optic nerve without evidences of previous neuritis; fundi normal otherwise. Field in the left eye limited to lower nasal quadrant. It was assumed that the cause of the atrophy was either an abscess in the sphenoidal sinus or a tumour pressing upon the chiasm. The former was excluded by a rhinologist. About two weeks later all sight was lost and the patient returned home. When at home under care of her family physician she had severe headache and delirium for a week, which symptoms subsided after a profuse discharge of pus and blood from the naso-pharynx. When this ceased symptoms of brain pressure returned and there appeared to be an infection of the right orbital tissues. From these facts, communicated to him, Shoemaker began to doubt his diagnosis and to think that after all there had been a sphenoidal abscess. Nothing more was heard of the patient for some months, when she reported in person that she had gradually recovered from the before-mentioned symptoms, had been in good health since, except for sharp pains through the temples. Eats ravenously and sleeps a great deal. Still no evidences were obtained of accessory sinus disease, but radiography showed an enlarged abnormal sella turcica. The original diagnosis was adhered to in spite of (1) the discharge from the naso-pharynx giving relief to brain symptoms (2) the apparent infection of the right orbital tissues. Pituitary tumours usually produce bitemporal hemianopsia. In this case, assuming the truth of the patient's statement, it was homonymous and the right optic tract was first involved. Cessation of menstruation at 16 years points strongly towards disease of the pituitary body, and the enlargement of the sella turcica could be caused only by some enlargement of this gland or a tumour in this location. The author then suggests that a cyst in the pituitary gland, beginning about puberty and developing slowly, might at 16 years of age have become large enough to lessen the gland function sufficiently to bring about cessation of menstruation. Continuing to enlarge slowly, it might press upon the optic tracts and chiasm, causing loss of vision and optic atrophy. Further enlargement might produce pressure enough to cause brain symptoms and to erode the thin plate of bone at the bottom of the sella turcica, allowing discharge of the contents through the sphenoidal sinus and into the naso-pharynx. The author finishes his paper with an account of the anatomy, physiology, pathology, and surgery of the pituitary body, but this should be read in the original. It may be noted that the retention cyst is probably the most frequent tumour found in the pituitary body. ERNEST THOMSON.

(3) **de Lapersonne**, of Paris, and **Cantonnet**, of Paris, report a case of tumour of the hypophysis in a young man of 23 years. The symptoms were of two years' duration. Right homonymous hemianopsia was present, the right eye

retained normal central vision, and in its blind temporal half there remained a small area in which perception of light persisted; the retained nasal portion was rather markedly contracted with irregular limits. The left eye retained light perception only in the temporal half of the field.

The pupil reflexes were present, active in the right but feeble in the left. Wernicke's sign absent. The right disc was pallid; the left uniformly white. The radiograph of the skull as a whole showed a dark mass at and below the region of the sella Turcica, increase in the cavity of the frontal sinus with inequality generally in the thickness of the cranial layers (as in acromegaly.)

Some signs of myxœdema were present, shown by a "full-moon" face, small size of fingers with infiltration of the hands, and small stature generally. The sexual glands participated, the testicles being of small size, with some hypertrophy of the breasts. The thyroid was slightly increased. Evidence of trophic alterations was present in the hairs, nails, and skin. Finally, hypophyseal hyperfunction was shown by cardio-renal troubles, namely, polyuria, slow pulse, and increase of blood-pressure. Some improvement in the vision had been effected before the case came under the authors by True, of Montpellier, by means of electrical treatment and Gibert's syrup, and subsequently a further improvement was obtained by the authors by the use of thyroid extract, the amelioration being both general and visual.

Speaking generally of this class of case, namely, a hypophyseal tumour without acromegaly, the authors state that three groups of signs are generally found. They are:—(1) glandular, where the alterations in the pituitary gland give rise to a loss of hypophyseal equilibrium, a condition of "dyshypophysis" according to them, and one in which other glands of internal secretion, namely, thyroid, testicles, ovaries, and supra-renals, may share. (2) "Physical" signs, *i.e.*, where radiography shows an increase of the sella Turcica, or possibly the outline of the tumour itself.

(3) "Mechanical" signs of two kinds:—(*a*) general intracranial hypertension, and (*b*) the phenomena of localised compression. The latter fall on the cranial nerves of the middle fossa, notably the oculo-motor nerves and peripheral optic tracts, and so give rise to the various visual troubles which may occur in these cases, and of which the alterations in the fields of vision are the most important.

A review is made of 79 similar cases published since 1860, taken in two groups, 18 being incomplete as far as the record of the visual fields, and 61 complete in this respect. Thirteen other cases are mentioned, but rejected as useless on account of insufficient *data*. The following deductions are obtained as far as the information goes:—

Sex and age, given in 71 cases, show that 41 were in men, the average age being 38½ years, and 30 in women of 31½ years average.

Visual affections—(*a*) *hemianopsia* and irregular contractions of the visual fields; bi-temporal hemianopsia was the most common and was recorded 17 times (21 per cent.) 9 times unilateral hemianopsia was given, but was probably bi-temporal at an earlier date.

(b) *Optic atrophy*, noted 37 times (46 per cent.), was complete or incomplete, and equal or unequal in the two eyes; in four cases it remained absolutely unilateral.

(c) *Papillœdema* only existed in 13 cases, *i.e.*, comparatively rarely. The ages of these cases were chiefly low, *i.e.*, from 14 to 29, two only being higher, namely 36 and 58 respectively. This, then, agrees with the ideas generally held with regard to the occurrence of papillœdema in intra-cranial tumours, namely, that the younger the patient the more likely is it to occur.

(d) *Exophthalmos* occurred seven times, and was due to prolongation of

the tumour into the orbit, or more often (always if the exophthalmos was bilateral) to cavernous sinus compression.

(e) *Ocular paralyses*, noted 23 times only (29 per cent.), *i.e.*, less frequently than might perhaps be thought. They were either an isolated unilateral ptosis (4 times), motor paralysis of one eye (9 times), or of both eyes (9 times).

With regard to treatment, which until recent years has been *nil*, the authors consider that hypophyseal extract should be given, but that it is difficult to know when on account of the impossibility of ascertaining for certain whether the gland is secreting too much or too little.

Other gland extracts should be added and do good, as, for example, thyroid extract in the author's case. In 8 cases treated surgically, 5 slight improvements are reported. On this point the authors quote Lecene's conclusions :— " the extreme difficulty of the exploration of the hypophyseal region which alone allows one to judge of the operability or otherwise of the tumour, makes one fear that the rational surgery of the hypophysis must remain from now onwards very infrequent in its indications and very uncertain in its results."

BERNARD CRIDLAND.

IV.—INJURIES OF THE OPTIC NERVE.

(1) **Evans, J. Jameson—Observations on Injuries of the Optic Nerve.** *British Medical Journal*, Sept. 11th, 1909.

(2) **Ruata, Vittoria.—A contribution to our knowledge of direct injuries of the optic nerve. (Contributo alla conoscenza delle lesioni dirette del nervo ottico.)** *Archivio di Ottalmologia*, March, 1910.

(1) **Evans**, of Birmingham, classifies injuries of the optic nerve into direct and indirect. In the former group are found some cases of bullet wound, and injuries with cutting instruments, whether accidental or surgical, during operations on the orbital contents or nose. The author also refers to the case in which, in obstetric practice, the obstetrician mistook an orbit for the anus and gouged out the eye, and to those cases in which the forceps blade is supposed to have torn out the eye. Regarding this latter accident the reviewer holds that such an accident is a practical impossibility, and that the reported cases have, in reality, been cases of extrusion of the eye by pressure on the orbit.

Indirect injuries to the optic nerve are more common than direct. The nerve may be partially or completely torn at the scleral foramen by blows on the eye itself. Partial or total blindness may result from blows on the orbital margin, particularly in cyclists. If the rider fall over the handle-bars the part injured will probably be the upper border; if he fall sideways he generally strikes the external angular process. The part of the visual field lost seems to depend on the direction of the force applied to the orbital margins. Ophthalmoscopic changes are at first absent, but appear in several weeks. Central vision often improves in a few months, but not the condition of the visual field. As to pathogenesis, Evans doubts Oettingen's statement that permanent blindness should seldom be attributed to concussion of the retina or optic nerve, and holds that in the less severe cycling accidents there is *contusion* of the nerve at the foramen by *contrecoup*, rather than laceration by bone or hæmorrhage into the sheath. Gunshot wounds may result in blindness and intraocular lesions without the projectile having touched the

eye or optic nerve. The author accepts Nettleship's explanation that the nerve and intraocular lesions are due to vibration effects. Falls or blows on the vertex may result in injury either by *contrecoup* or by laceration. Compression of the skull during delivery, whether against the promontory or by the forceps, may give rise to optic atrophy, due either to bony pressure on the nerve or to hæmorrhage into the nerve or its sheath.

ERNEST THOMSON.

(2) Whilst working in the *clinique* of Lodato, of Palermo, **Ruata** saw a boy of nine years who had fallen whilst playing with a knitting wire. The needle passed upwards between the upper lid and the globe of the right eye, and so into the orbit, with the result that the sight was lost. The pupil was dilated and the light reaction of the iris was absent. There was no lesion in the fundus, and none was observed until three months later, when atrophy of the nerve began.

Ruata analyses various cases of similar nature with the object of discovering what symptoms are evidence pointing to the exact site of the lesion. These symptoms may be shortly recalled as follows.—A probable cause, followed by blindness with dilatation of the pupil, indicates that the optic nerve has been injured.

If there are no fundus changes manifest within a few hours, it is probable that the site of the lesion is further back than the entrance of the central vessels (12 mm. behind the sclera). If, on the other hand, changes are developed in the fundus at an early date, it is evidence that the vessels have been injured either in the nerve or close to it. The changes likely to be seen are similar to those associated with embolism of the central vessels.

As an interruption of the centripetal path of the light reflex (the optic nerve) is followed by loss of the direct light reflex, so loss of the consensual reflex follows interruption of the centrifugal path (the ciliary ganglion and nerves). In such cases the pupil may be of uneven outline and the sensation of the globe may be interfered with. The prognosis is in any case bad.

LESLIE BUCHANAN.

V.—CORNEAL TRANSPLANTATION.

Balbuena.—Some attempts at corneal transplantation by a new method. (Algunos ensayos de transplantacion corneal por un nuevo procedimiento.) *Arch. de Oftal.*, Deciembre, 1909.

The number of blind who are so only on account of corneal defect, drives us to attempt some form of corneal transplantation, says **Balbuena,** and, so far, von Hippel's method has failed usually, although in isolated cases it has given brilliant results. Partial keratoplasty has given better average results, but even in this there is great fear of death of the graft, and the difficulties of the operation are great. The theoretical demands for success are that the graft should have a good and early supply of nutrition, and that it should acquire sensation.

When we consider the conditions in von Hippel's operation, how that the cornea receives nutrition only from its edge, and the difficulty there is in securing apposition between the edge of the graft and the edge of the wound, the wonder is, not that many cases fail, but that any succeed. The author thinks that by extending the edge of the graft, by carrying it under the

conjunctiva into contact with the nourishment of the subconjunctival space, he can give the graft a better chance of life. His experiments have been conducted on dogs, and he has gained his end by using as a graft a cornea bigger than the one on which he was operating.

He dissects up the conjunctiva round the corneal margin, and fixes it over the edge of the graft, having first removed the epithelium from that region which will be covered by the conjunctiva afterwards.

In the experiments Balbuena had considerable success, and this was most marked where the whole cornea was not removed from the eye in which the graft was placed, but only the anterior layer; here the graft so far retained its transparency that two months after the operation the fundus could be seen perfectly. The cornea remained insensitive. Balbuena proposes to perform the operation in the human eye and to use for the graft the cornea of dogs; this would seem to be less satisfactory than the use of grafts of the same species as the host on which he is operating. HAROLD GRIMSDALE.

VI.—CHANCRE OF THE EYE.

(1) **Houdart, E.—Three cases of chancre of the eye.** (Trois cas de chancre à l'œil.) *Recueil d'Ophtalmologie*, novembre, 1909.

(2) **Villemonte de la Clergerie.—Syphilitic chancre of the right bulbar conjunctiva.** (Chancre syphilitique de la conjonctive bulbaire droite.) *Archives d'Ophtalmologie*, janvier, 1910.

(1) **Houdart**, of Brest, discourses on the necessity and difficulty of early diagnosis of extragenital chancres and the danger of infection of children affected with wounds, sores, or impetigo, especially in institutions where children are allowed to use each others toys, toilet articles, etc. Houdart records the case of a baby who was sent to a wet nurse, and when returned was in a condition of extreme emaciation, with skin loose and of leaden hue. A month and a half later the mother had a small tumour on the right lower lid near the ciliary margin. There was only slight inflammation of the surrounding tissues but a week later there was a smaller oval flat ulcer of the tumour which now had a hardened base, and there was enlargement of the preauricular gland The appearances of the ulcer and its further developments led to the diagnosis of syphilitic infection from the child. A chancre may be attributed to an accident at work, as in the author's second case. The worker was said to have had a wound on the right upper lid from an iron bar. When seen three weeks later, there was an almond-shaped sharply cut ulcer of the upper lid which did not involve the ciliary border. Its base was reddish with a fine coating of yellowish pus, the margins were raised, red, and irregular, and there was induration around it involving the greater part of the lid. The preauricular gland was enlarged and indurated, and the parotid and submaxillary glands were also enlarged General signs of primary and secondary syphilis developed later and confirmed the diagnosis. The author regarded the infection of the wound as an indirect result of the accident. In a third case a chancre of the mucous surface of the right lower lid was attributed to a bite. Originally painless, apart from some irritation of the cornea by contact, it gave rise later to intense swelling of the lid, chemosis, entropion, blepharospasm, and abundant conjunctival discharge suggestive of blennorrhagic infection. The

ulcer, which was bleeding, did not involve the ciliary margin, and rested on a zone of cartilaginous induration. There was a slight induration of the lymphatic gland near the buccal pad of fat.

The author discusses the question of the possibility of infection of the eye by soft sore and considers that its occurrence has been proved.

J. Jameson Evans.

(2) **Villemonte de la Clergerie**, of Nice, records the occurrence of a primary syphilitic sore on the bulbar conjunctiva of a woman, aged 26 years. The source of infection was a syphilitic child, which had been nursed by the patient for ten days, beginning one month before the onset of symptoms. The ulceration cleared up in two months, leaving the eye free from permanent damage. Spirochætes were found. Bernard Cridland.

VII.—THE OPHTHALMIA OF SALVAGE MEN.

Trantas.—Superficial keratitis caused by sulphuretted hydrogen, or ophthalmia of salvage men. (Kératite superficielle provoquée par l'hydrogène sulfuré ou ophtalmie des sauveteurs.) *La Clinique Ophtalmologique*, 10 mai, 1910.

Trantas, of Constantinople, gives an account of what seems to be a very unusual condition.—A number of men, belonging to a salvage boat, who were engaged in floating a ship which had foundered with a cargo of grain, became afflicted with severe ophthalmia, and were obliged to quit their work. Trantas found that they all presented the same clinical picture.—There existed intense irritation of both eyes, pronounced photophobia, lacrymation, and hyperæmia of the conjunctiva around the limbus, but no conjunctival secretion. The cornea, seen by the naked-eye, appeared intact, but when examined with a magnifier, revealed a slight superficial, grey, diffuse haziness situated only in the part exposed to the air in the palpebral fissure. This band stained a beautiful green with fluorescein. It was possible, in places, to observe that it was composed of masses of dots or little separate *plaques*. The visual acuity was not much affected. Simple treatment resulted in complete cure in a day or two. Regarding the cause of this condition, since all the seven individuals were afflicted in the same way, on the same day, and when doing the same work in an atmosphere which was apparently highly charged with sulphuretted hydrogen, there could be no doubt that this gas was the cause. The cause of the evolution of the gas was the decomposition of the grain, which had been under sea water for a month; the gas escaped in large volume when the vessel was raised to the surface. Although there seems to be no literature describing this corneal condition as the result of exposure to sulphuretted hydrogen, the symptoms seemed to be well-known to the master and mate of the salvage vessel. Conjunctivitis and severe irritation have been described (Graefe-Saemisch *Handbuch*, XXII, Part 2, p. 115, 2nd edition) and Trantas suggests that the corneal trouble has escaped observation. Ernest Thomson.

VIII.—THE RING MAGNET.

(1) Klingelfuss.—Investigations upon the distribution of the magnetic intensity in the field of operation with the ring magnet. (Untersuchungen über die Verteilung der Magnetischen Intensität im Operationsfeld beim Innenpol-magneten.) *Zeitschrift für Augenheilkunde*, Januar, 1910.

(2) Hallauer, Otto.—Improvements in the ring magnet. (Neuerung am Innenpolmagnet.) *Zeitschrift für Augenheilkunde*, Januar, 1910.

(1) Schirmer has stated that a grave practical defect in the ring magnet is that the lines of force are all concentrated at the centre of the ring, and so the magnetic intensity rapidly falls off towards the periphery. **Klingelfuss**, the maker of the magnet, now shows that this is not the case. After considering the mathematics of the question, he describes experiments which he made with a weighted iron rod. These showed that the magnetic force was rather more intense towards the circumference than at the centre. Practically, from an operation standpoint, it makes no difference where the head be placed in the ring; the magnetic force is always sufficient fully to saturate the foreign body and the metal rod used to attract it. T. HARRISON BUTLER.

(2) This paper, by **Hallauer**, of Basle, describes the new method adopted by the makers of the ring magnet in mounting the heavy solenoidal ring. The iron ring is now balanced in such a way that it can be used in any desired position either to a sitting, a reclining, or a supine patient. The illustrations clearly demonstrate the method chosen. The author finishes his paper by explaining that Schirmer is in error when he states that the magnetic force is only concentrated at the exact centre of the ring; for all practical purposes, it is equal in amount at any spots within the solenoid.

T. HARRISON BUTLER.

IX.—THE SIGNIFICANCE OF HANDWRITING.

(1) Uribe Y. Troncoso, M.—The influence of the different forms of handwriting on the hygienic posture and the deformities of school children. (La influencia de las diversas clases de escritura en la postura higienica y las deformaciones de los ninos de las escuelas.) *Anales de Oftalmologia*, Deciembre, 1905.

(2) Péchin A. and Ducroquet.—On the significance of caligraphy from an ophthalmological and orthopædic standpoint. (Ueber die Bedeutung der Schrift vom ophthalmologischen und orthopädischen Stundpunkte.) *Zeitschrift für Augenheilkunde*, July, 1909.

Troncoso, of Mexico, concludes (1) that the faulty position of children during the act of writing depends rather on the faulty construction of the desks at which they sit, than on the form of handwriting adopted.

(2) When the light is good and the child sits at a properly constructed and selected desk, suitable to its height, slanting script on slanting paper is the most convenient and easy. (In this position each letter is really at right angles to the line joining the two pupils and is sloped only with reference to the paper.)

(3) When the desk is faulty, either because the seat is too far from the table, or the table is too high or low, it is better to adjust the paper at right angles to the interpupillary line and to write vertically on this.

(4) It is very important to avoid placing the paper quite to the right of the child, as this is very prejudical to vision. He recommends that the paper should be directly opposite to the centre of the child's body, forming as large an angle as possible with the border of the desk.

(5) He emphasizes the importance of giving the child his appropriate correction, since with uncorrected errors of refraction, he cannot preserve a correct attitude even with perfect furniture. HAROLD GRIMSDALE.

(2) **Péchin** and **Ducroquet**, Paris.—This paper has been somewhat indifferently translated from the French, and, as the illustrations have been transposed, it is exceedingly difficult to gather the original meaning of the authors. The text would lead one to suppose that the question at issue was the relative merits of upright writing (*Grad-schrift*) and sloped writing (*Schräg-schrift*), and with this conception in the mind it is difficult to follow the argument. We believe, however, that Figs. 1 and 3 have been transposed, and that the real point is that it is better from an ophthalmological and orthopædic standpoint to write with the paper placed obliquely on the table than in the orthodox way taught in schools with the paper square with the table. In the former case the body rests upon both elbows, the hand traces a circle with the elbow as centre, and the elbow remains stationary. The only movements necessary, apart from this rotation, are simple flexion and extension of the fingers. The conventional method demands that the whole wrist, arm, and hand shall travel along the paper; it is fatiguing, and entails complex movements of the hand and upper extremity, and results in twisting of the spine and derangements of the eyes. Probably few have thought of the matter from this standpoint, and the communication will ease the consciences of many who invariably write with the paper placed obliquely and yet always feel that they are breaking most sacred rules inculcated in the writing school. Reading the paper will make many of us happier men and women, and if only the school authorities would study it and act accordingly, all children would rise up and bless the authors, who have liberated them from the formalism of orthodox caligraphy and all its attendant miseries. At the same time we have some doubts whether the translator has himself grasped the real meaning of the original French paper. T. HARRISON BUTLER.

X.—PAPILLŒDEMA.

Horsley, Sir Victor.—"Optic Neuritis," "Choked Disc," or "Papill-œdema": treatment, localizing value, and pathology. *British Medical Journal*, 5th March, 1910.

The main object of this paper, by **Horsley**, of London, is the vindication of his view that in cerebral tumour the optic neuritis is ipsolateral with the tumour, appears first in the tumour side, or, as he expresses it, on the side of a "tension lesion."

After referring briefly to views which have been held as to the mechanism of papillœdema, the author puts forward four points for discussion:—

1. *The localizing diagnostic value of optic neuritis.*—Horsley's view that we have a valuable aid to clinical diagnosis in the fact that the papillœdema begins on the side of a tension lesion, and, as a rule, is more severe than that on the opposite side, is in direct opposition to the opinion of Deutschmann and was questioned by Leslie Paton in his communication to the Ophthalmological Society. Paton's conclusions were in the main based upon the

degree of swelling, but this is not so instructive as the minute degenerative changes in the disc. The severity of the intracranial pressure can be judged more precisely by the secondary histological changes in the disc. In advanced cases it is necessary to judge by such changes, because one disc may be subsiding into atrophy while the swelling of the other is rising. A tabulated list is given of the uncomplicated tumour cases—eighteen in number—as they happened to occur at the National Hospital for the Paralysed and Epileptic during 1908. These cases were examined by Paton and Horsley. This table, says the author, speaks for itself, and shows that ipsolaterality is the rule and contralaterality the rare exception. Among these eighteen unselected cases, in two the correctness of the localization diagnosis depended wholly on the degree of the neuritis. If the responsibility of the surgeon can be thus relieved on the all-important question as to which side of the head he is going to open, what better demonstration, asks the author, of the truth of his clinical position can be offered? Three cases from private practice are then related, which all support the author's view as regards ipsolaterality, and which also illustrate his contention that any discussion of papillœdema to be profitable must include a detailed consideration of the clinical features in each case.

2. *The part of the disc which becomes œdematous.*—Further observation has convinced Horsley, that, as he suggested three years ago, the papillœdema usually begins at the upper nasal quadrant. This region of the disc must be carefully watched in suspicious cases. In two early cases in which the eyes were removed *post-mortem*, the retrobulbar ampulla was most marked on the dorsum of the nerves. Whatever the cause of this phenomenon may be—and it is probably structural—the anatomical fact seems to be constant.

3. *Proof of Marcus Gunn's interpretation of the production of the macular figure.*—Gunn stated that the macular star in œdema of the retina was caused by tension lines centred at the fovea. Horsley has brought forward proof of this. In an eye from a case of early optic neuritis, having fixed the fundus, not only with formalin and osmic acid, but afterwards with absolute alcohol, he exposed the preparation to drying. During life no macular figure had been present nor any ophthalmoscopic folds, but as the drying proceeded, the retina began to crinkle in a star-shaped pattern, the centre of which was the fovea. Microscopically, the intima was seen to be raised, *i.e.*, the effect of the tension makes itself felt first in the nerve fibre layer. "This last point is important, because there evidently exists some confusion as regards the anatomy of the white spots in the macular figure and their localization according as to whether the changes in the fundus are due to cerebral tumour or albuminuric toxæmia. Mr. Gunn, for instance, spoke as though the white spots are necessarily due to changes in the deeper layers of the retina, as in albuminuric retinitis. But both ophthalmoscopically and experimentally it is clear that the white spots, whether on the disc itself or around the macula in cerebral tumour, are in the nerve fibre layer."

4 *Phagocytes of the Retina.*—The above referred to white spots being the most important of the secondary histological changes of value in estimating the degree and effects of neuritis, the author discusses them more in detail under the general question of *the phagocytes of the retina.* This is not suitable for abstract, and must be read in the original to be understood.

The article is illustrated in a special supplement of twenty-three black and white plates. There are copious references to literature.

ERNEST THOMSON.

A new European "Bulletin," Midsummer, 1910, is now ready, the contents of which are reproduced below. Copies will be forwarded to any surgeon on application.

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XI.—INFLUENZAL OPTIC NEURITIS.

Mustakas.—Influenzal optic neuritis. (Névrite optique grippale.) *Recueil d'Ophtalmologie*, avril, 1908.

The optic neuritis of influenza is generally a papillitis, more rarely a unilateral or successively bilateral retrobulbar neuritis. It may be a bilateral descending neuritis secondary to influenzal meningitis. **Mustakas's** patient was a man, aged 38 years, who complained of supraorbital pains and a painful dragging sensation in the left eyeball. The sight of the left eye was failing (V.=1/2), and ophthalmoscopical examination showed haziness of the edges of the left disc and some change in its colour. Lower and outer part of the visual field retracted. No change in the right eye. Five days later, the patient developed signs of influenza, and the optic neuritis became very marked. Vision reduced to 1/6, and the visual field markedly contracted, especially down and out. The right disc also became a little blurred. The influenzal fever subsided in about a week, and the neuritis gradually subsided, but the disc showed some post-neuritic atrophy. L.V.=1/4 a week after the influenzal attack and L.V.=2/3 two months later, with slight permanent contraction of the field down and out.

J. Jameson Evans.

XII.—RETINITIS CIRCINATA.

Fisher, J. Herbert.—Retinitis circinata and its relation to other forms of retinitis with hæmorrhages and exudates. *Royal London Ophthalmic Hospital Reports*, January, 1910.

Fisher, of London, reports a case of retinitis circinata, and finding it very closely resembles others reported by Coats in Vol. 17, Pt. 3, of the *Reports*, as also certain other cases allied to retinitis circinata which he has seen, he considers them together in this paper. Coats' cases are six in number, and in nearly all of them massive exudations were situated and most marked at the periphery, and pathological examination led him to conclude that the masses were primarily of hæmorrhagic origin. A very careful and detailed review of Coats's paper is here given. Fisher also reviews other recorded cases.

His own case is that of a man age 62, of alcoholic tendency. The right fundus showed the typical elliptical wreath of white dots surrounding the macula in the manner characteristic of retinitis circinata, while other marks were situated close to the primary ring. The vision of the eye was reduced to fingers. The left eye still saw $\frac{6}{9}$ and with sph. $+ \cdot 25$ $\frac{6}{6}$. There was an arch of evenly diffused retinal hæmorrhage extending out above the macula from the upper-outer part of the disc. These changes all became more marked, and all were seen to be associated with hæmorrhages, but they very considerably altered in appearance. The patient was first seen in April, 1902, and in the following November he was advised to take far more rest, and this, combined with treatment, caused great improvement in his health. Thirteen months later, there was seen to be no remnant of

anything like circinate retinitis in either eye, but there was much old exudate in the deeper retinal layers, with pigment scattered over the central part of the right fundus. The changes in the left eye were similar but less extensive. The view which this case emphasises is that hæmorrhage forms the basis upon which are formed the spots of which the exudate in retinitis circinata is composed.

His next case is one of degeneration of the retinal vessels associated with cardiac disease. The patient was a boy, aged 13, who had rheumatic fever when five years of age, which had left mitral disease and the heart large and dilated. There was retinal exudation in the right eye, forming a segment of a circle which, had it been complete, would have been typical of retinitis circinata; the dots of exudate were rather small. "Silver wire" arteries were present with some minute aneurysmal dilatations and hæmorrhagic spots. The other eye was normal. This shows that vascular degeneration is an important element in some cases.

The next case was of a man, aged 22, who is an example of retinitis of a circinate type, with binocular arterial disease. The left eye showed a ring of retinal exudation of great brilliancy. The arteries were of the "silver wire" type. There was much old choroido-retinitis at the periphery, and white sheathing of veins, which at places were greatly constricted.

His last patient was a lady, aged 29, unmarried, and with no notification of syphilis either acquired or inherited. Her right eye had been defective for years, but a week before Fisher saw her she had noticed a black spot before the left eye which got more dense for 24 hours, and then remained stationary. In the right eye there was fine vitreous haze and in the periphery on the temporal side a white glistening globular area over which the retinal vessels were raised The changes did not appear to be recent. In the left eye was a large horse-shoe shaped patch of exudation with slight disturbance of retinal pigment. Her general health was found to be perfect. The condition gradually improved. At the time she was anæmic, had menstrual disturbance, was inclined to epistaxis, and suffered from local syncope of the fingers and from chilblains, while the retinal vessels were not above suspicion. Fisher concludes by stating that on clinical grounds the evidence is sufficient to prove that the pathological processes which cause retinitis circinata are the sequel of hæmorrhage in the outer reticular layer of the retina. Hæmorrhages which invade the subretinal space from the outer reticular layer may organise, as Coats has shown, with prominent masses of fibrous exudation, and this condition may be associated with retinitis of a circinate type. C. DEVEREUX MARSHALL.

XIII.—DISEASES OF THE FUNDUS IN PSYCHOSES.

Wintersteiner, Hugo.—**The diseases of the fundus in psychoses. (Die Erkrankungen des Augenhintergrundes bei Psychosen.)** *Zeitschrift für Augenheilkunde*, Jan. and Feb. 1910.

Wintersteiner, working at the old Asylum at Vienna, has investigated the fundi in upwards of one thousand of the inmates, and in this communication

he presents the results of his untiring labour. The patients examined were as follows :—

General Paralysis	288 Cases
Paranoia	158 „
Alcoholic-psychoses	111 „
Dementia præcox	120 „
Epilepsy	60 „
Amentia	58 „
Senile Dementia	40 „
Imbecility and Idiocy	41 „
Periodic Insanity	43 „
Melancholia	31 „
Psychopathia e cerebropathia ...	16 „
Hysteria	16 „
Moral Insanity	16 „
Neurasthenic Insanity	7 „
	1,005 cases

Ophthalmoscopic appearances in general paralysis of the insane.—220 of the cases were men, 68 women.

In 43 cases the author found temporal pallor. In 21 cases discoloration of the whole nerve, and in nine complete primary atrophy. In four cases atrophy followed optic neuritis, and in six was associated with retino-choroiditis. That is to say, in 28.8 per cent. of the cases there was evidence of optic atrophy.

Hyperæmia of the papilla was present in seven cases, and optic neuritis in four cases. Opacity of the retina was detected three times, retinitis once, choroiditis eleven times, macular changes 49 times (non-myopic) and arterio-sclerosis was present in 22 cases,

The only change characteristic of the disease was simple primary atrophy, a descending degeneration of the nerve.

The relations of this change to inflammatory processes are fully discussed, and the part played by alcohol and nicotine, and choroidal and retinal conditions are carefully differentiated from the true atrophy.

The author failed to detect any retinal changes such as œdema, arteriosclerosis, or circumpapillary retinitis, which could be regarded as pathognomonic of the disease.

The views of other ophthalmologists receive careful and exhaustive consideration. In discussing their divergent opinions he points out the necessity of dilating the pupil. A dusky retina often looks opaque when examined through a small pupil, but when the pupil is dilated, it is frequently seen to be normal. Wintersteiner concluded that the "*retinitis paralytiker*" described by Klein has no existence. Klein was probably deceived by folds in the *membrana limitans interna*. The frequency of choroidal changes is easily explained in the light of the now universally recognised syphilitic ætiology of general paralysis, but the author finds that the percentage of choroiditis among cases of progressive paralysis and the other psychoses is exactly the same. This paradox is very difficult to unravel.

Ophthalmoscopic appearances in alcohol-pschoses. — Among 111 cases, temporal pallor was noticed 39 times, and definite optic atrophy five times. Generally speaking, this temporal pallor was not associated with defective vision, and only very occasionally passes into general atrophy.

Optic neuritis is often seen in alcoholic psychoses. The author observed it five times.

Ophthalmoscopic appearances in senile dementia.—Arterio-sclerosis plays such a large part in the pathology of this disease that we should expect to find frequent evidence of it in the fundus. It was present in half the cases examined, and was associated with irregular pigmentation of the pigmented epithelium. In consequence, the choroidal vessels are very plainly seen, and they, too, are frequently sclerosed.

Psychopathiæ cerebropathia circumscripta.—In this disease we expect to find positive results from ophthalmoscopy. The appearances naturally vary with the nature of the lesion which causes the psychic aberration. Tumour cerebri is often accompanied by choked discs and optic neuritis and in later stages by secondary atrophy.

Ophthalmoscopic appearance in epilepsy.—There is no typical change in this disease. Some authors have found pallor of the retina after a fit; others extreme hyperæmia. The literature of the subject is large, but quite inconclusive.

Ophthalmic appearances in paranoia.—The pathology of this disease is unknown; it appears to be a pure psychosis. It is therefore hardly reasonable to expect definite changes in the fundus. But all authors, including the writer of the paper, have noticed the relative frequence of temporal pallor and optic atrophy.

Ophthalmoscopic appearances in dementia præcox.—A normal fundus was found in 39 per cent. of the cases: hyperæmia in 39 per cent., and anæmia fundi in 15.85 per cent. The hyperæmia was not always a permanent condition. Errors in development and abnormalities, such as albinism, were present in 10.83 per cent. of all the author's cases, a very high figure.

The other psychoses examined showed nothing very characteristic. A lengthened bibliography is appended to the communication.

T. HARRISON BUTLER.

XIV—EMBRYOLOGY.

(1) Contino.—On the development of the plica semilunaris and the caruncle in man. (Sullo sviluppo della caruncola e della plica semilunare nell'uomo.) *La Clinica Oculistica*, June, 1909.

(2) v. Knafe, Ernst.—Studies on the part played by the anterior part of the vitreous in the embryology of the cornea. (Studien über die Rolle des vordern glaskörpers in der Embryologie der Hornhaut). *Mitteilungen aus der Augenklinik der Carolinischen Medico-chirurgischen Instituts zu Stockholm*, 1910.

(1) This study is the result of the careful examination of the large series of human embryos belonging to Professor Cirincione, and the following are the chief conclusions.—At the tenth week, when the adhesion of the lid margins is taking place, there appears behind the internal commissure, a sickle-shaped fold; this rises up from the extremity of the fornices, extending further into the inferior than the superior fornix. This fold is the plica. The caruncle, on the other hand, appears a few days after the plica as an excrescence arising

from the posterior border of the lower lid close to the internal canthus. The further details of their development are given very fully in the article, which is copiously illustrated by photographs of sections and of models built up from the series of sections examined. H. GRIMSDALE.

(2) **v. Knafe** (Helsingfors).—Henson in 1866 noticed in the situation of the developing cornea a tissue whose genesis and structure has not been explained even in recent years. Not until the development of the vitreous was seriously studied has a solution of the problem appeared in sight. In 1903, Lenkossék and Von Pée independently discovered certain wedge shaped structures in connection with this membrane which formed the embryonic vitreous. The former introduced into embryology the new term "Vorderer Glaskörper," *anterior vitreous*, pointing out that the anterior vitreous had a definite origin apart from the posterior. The author has continued these investigations using the eyes of hens, ducks, pigeons, dog fish, frogs, and rabbits. We cannot here follow him through his long and painstaking researches, which should be read in the original by all embryologists interested in the development of the eye. He concludes that the anterior vitreous and and the corneal plate are produced together, the posterior vitreous developing from the lens and the retinal layer. The whole vitreous has an ectodermal origin. Cells from the mesenchyma wander into the anterior vitreous, but avoid one region which eventually becomes Bowman's membrane. Descemet's membrane develops as a pellicle before diapedesis of mesenchyma cells occurs. Both membranes are therefore developed from the anterior vitreous That portion of the anterior vitreous which lies between these two membranes forms a scaffolding for the mesenchyma cells which form the parenchyma of the cornea. T. HARRISON BUTLER.

XV—INFLUENCE OF THE EYE UPON THE EAR.

Ryerson, G. Sterling.—The pathogenic influence of the eye on the ear. *Canadian Practitioner and Review*, July, 1909.

The writer refers to a recent article by Rollet in the *Revue Hebdomadaire de Laryngologie, d'Otologie, et de Rhinologie*, in which he shews that the phenomena of tinnitus may be produced under irritation by disease of the cornea, iris, and cornea. He adds two cases illustrating this fact :

CASE 1.—C. E. J., consulted him in April, 1905, complaining of floating spots, pain in the eyes, and headache. The ophthalmoscope showed opacities in the vitreous, choroiditis of macular area, and a considerable degree of myopia. On October 18th, the patient came back, stating that he had been accidently struck over the left eye. The upper and outer section of the retina was hazy and indistinct. Later he returned, complaining of a noise in the head, of a buzzing or singing character. Examination of the ears was negative. Weak solutions of dionine and fomentations gave relief, and with the subsidence of the eye symptoms, the noise in the head ceased. This occurred several times. The singing was more noticeable in the left ear, corresponding to the left and more myopic eye.

CASE 2.—Miss J. H., consulted him in May, 1909, complaining of headache and defective vision. Examination showed media clear, extensive choroidal changes in region of the yellow spot, with pallor of both of the nerves. There was a slight degree of nystagmus. Noises in her head occured with eye and headache. Examination of ears negative. The writer believed that the tinnitus was caused by the ocular disturbance, as the tinnitus appeared and disappeared with the increase or decrease of the ocular irritation.

HANFORD MCKEE.

XVI—REMEDIES.

(1) Ravault, Gastinel, and Velter.—The effect of lumbar puncture in certain cases of amblyopia. *Gazette des Hôpitaux*, juin, 1909.

(2) Axenfeld, Th.—Critical remarks to A. von Hippel's paper on the therapeutical value of Deutschmann's serum. (Kritische Bemerkungen zu der Arbeit A. v. Hippel's über den therapeutischen Wert von Deutschmann's Serum.) von Graefe's *Archiv f. Ophthalmologie*, Bd. 75, 1, Heft, April 19, 1910.

(3) E. E. Blaauw.—The value of correcting lenses in general pathology, and method of examination. *Ophthalmology*, April, 1910.

(4) Fukala.—A method of rendering the eyeball completely anæsthetic in cataract and glaucoma operations. *Canada Lancet*, May, 1910.

(5) Jusčlius, Emil—Experimental investigations upon regeneration of the corneal epithelium under normal conditions and under the influence of therapeutics. (Experimentelle Untersuchungen ueber die Regeneration des Epithels der Cornea unter normalen Verhältnissen und unter therapeutischen Massnahmen.) von Graefe's *Archiv f. Ophthalmologie*, Bd. 57, 2 Heft, 10 Mai, 1910.

(1) The authors record a temporary improvement of vision in a case of tumour at the time cerebro-spinal fluid was evacuated by lumbar puncture.

A similar observation was made in a case of urticaria with bilateral iridochoroiditis with increased intraocular tension.

They have used lumbar puncture in cases of arterial hypertension with defective vision. In two of these cases there was no ocular lesion. In another case the failure of vision seemed related to attacks of eczema. There was congestion of the papilla without hæmorrhages. Improvement in sight was very apparent after lumbar puncture, and in one month improved from $\frac{4}{10}$ and $\frac{2}{10}$ to 1 and $\frac{7}{10}$. At the same time arterial tension fell from 22 to 15 and the pruriginous attacks disappeared. J. JAMESON EVANS.

(2) **Axenfeld** refers to A. von Hippel's paper (*vide* THE OPHTHALMOSCOPE, 1909, p. 869), the conclusions of which he criticises. He thinks that yeast-serum can never substitute cauterisation in suitable cases, because it is unreliable and leads to waste of time. The same objection had to be raised against Roemer's pneumococcic serum, although this latter had a much better scientific foundation. Deutschmann's serum must, if it be used at all, be used only as an adjuvant, except it be in cases the general character of which allows of dilatory treatment. R. GRUBER.

(3) After discussing the importance of correcting errors of refraction for the relief of nervous, digestive, and other obscure and obstinate conditions, **Blaauw** states that American ophthalmologists are divided into those who do and those who do not use a mydriatic in the estimation of refractive errors. He is one of those who look upon the use of a drug as unscientific, unnecessary, and troublesome for the patient. He apparently puts his faith in direct ophthalmoscopic measurement, the ophthalmometer, and subjective testing. In doubtful cases he verifies with skiascopy. A. J. BALLANTYNE.

(4) It is important to secure complete anæsthesia in cataract, glaucoma, and pupil operations, so that the patient should be perfectly passive and should not resist the surgeon; otherwise there is great danger of injuring the capsule or not cleanly abcising the iris. In cataract operations there is the additional

danger in unruly patients, and there are many such, of losing vitreous. Especially is this true of extraction of the lens in myopia operations. Such accidents unfortunately often happen by imperfect local anæsthesia.

The 2 per cent. cocaine solution is not sufficient to produce total loss of sensibility. For the last eighteen months **Fukala**, of Vienna, has used the following method, which he states is very successful.—He injects with a Pravaz syringe under the conjunctiva, a fifteen per cent. cocaine solution. A large bleb forms, which soon disappears, and after fifteen minutes, it will be found that the eye is entirely insensitive. He uses also a solution of adrenaline chloride of the same strength, separately or mixed with the cocaine solution. This method should not be used in children up to fifteen years, in marasmus, and in severe heart affections. G. STERLING RYERSON.

(5) The results of **Juselius's** experiments may be briefly summarised as follows.—1. Immediately after removal of a portion of the epithelium in the centre of the cornea mitosis begins at the corneo-scleral margin, distant from the defect, and proceeds centripetally until it reaches the erosion about two hours afterwards. Karyokinesis in the periphery ceases between eight and twelve hours later. 2. Regeneration proper in the defect begins only four hours after the injury. The covering-over proceeds at the rate of about 1 square millimeter within twelve hours in the rabbit. 3. There is no passive pushing of the original epithelium over the border of the defect. 4. Cocainum muriaticum (even when greatly diluted) interferes with the regeneration; subconjunctival saline injections slightly increase it in 2 per cent. solution but damage it in 4 per cent. and 6 per cent. solutions: corrosive sublimate, in dilution 1 : 10,000, acts similarly to, but more irregularly than, the 2 per cent. saline, while a sublimate injection of 1 : 2000 is harmful. Dionine in 10 per cent. solution slightly accelerates the process, but more in the rabbit than in the dog. Warmth helps and cold injures the reparation.

R. GRUBER.

XVII.—MISCELLANEOUS.

(1) **Stephenson, Sydney.**—A case of blepharochalasis (ptosis adiposa). *Proceedings Royal Society of Medicine*, December, 1908.

(2) **Westhoff, C. H. A.**—Complete bilateral ophthalmoplegia. (Ophthalmoplegia totalis duplex.) *Centralbl. f. prak. Augenheilk.*, December, 1908.

(3) **Langenhan.**—An unusual form of bilateral congenital partial cataract with cholestearine crystal formation in childhood. (Aussergewöhnliche Form doppelseitiger Kongenitale partieller Katarakt mit Bildung von Cholestearin Kristallen im Kindesalter.) *Zeitschrift für Augenheilkunde*, Juni, 1909.

(4) **Bediger, Hans.**—On dry operations in ophthalmology. (Ueber Trochen Operationen in der Augenheilkunde.) *Zeitschrift für Augenheilkunde*. Juli, 1909.

(5) **Kalish, Richard.**—Eye changes in Bright's disease. *American Medicine*, September, 1909.

(6) **Bordley, James, and Cushing, Harvey.**—Alterations in the colour fields in cases of brain tumour. *Archives of Ophthalmology*, September, 1909.

(7) Frenkel H.—Extraction of opaque dislocated lenses. (Extraction de cristallins cataractés et subluxés.) *Recueil d'Ophtalmologie*, novembre, 1909.

(8) Kummel, R.—Contribution to the significance of Wassermann's reaction, and the reaction to old tuberculin in cases of interstitial keratitis. (Ein Beitrag zur Bedeutung der Wassermannischen Reaktion und der diagnostischen Alt-Tuberkulininjektion für die Erkenntnis der Aetiologie der Keratitis parenchymatosa.) *Klin. Monatsbl. f. Augenheilkunde*, Dezember, 1910.

(9) Lawford, J. B.—The eyesight of motor drivers. *Lancet*, January 29th, 1910.

(10) Pannell, Walter L.—Mixed astigmatism with meridians of astigmatism not crossing at right angles. *Ophthalmology*, January, 1910.

(11) Kuntz.—Touch at a distance and the sense of obstacles. *Congrès International de Naples*. Report in *La Clinique Ophtalmologique*, 10 janvier, 1010.

(12) Fox, L. Webster.—Massage as an occupation for the blind. *Ophthalmology*, January, 1910.

(13) Howe, Lucien.—Demonstration of the size and position of the angle alpha by a simple modification of the Javal-Schiötz ophthalmometer. *Ophthalmology*, January, 1910.

(14) Nagel, C. S. G.—Visible movement of blood in the retinal vessels. *Ophthalmology*, January, 1910.

(15) Head, Henry.—Congenital lues causing optic atrophy, and ultimately leading to dementia paralytica juvenilis. *Proceedings Royal Society of Medicine*, January, 1910.

(16) Rönne, Henning.—Atrophy of the optic nerve in a case of pressure stasis,—contribution to the genesis of pathological excavations. (Sehnerven atrophie nach "Stauungsblutungen"—Beiträge zur Genese der pathologischen Exkavationen.) *Klin. Monatsbl. f. Augenheilkunde*, Januar, 1910.

(17) de Lavigerie, Duboys.—Contusion of the eyeball. Mydriasis. Tear of the Choroid. *La Clinique Ophtalmologique*, 10 février, 1910.

(18) Deschamps.—Another word as to the measurement of visual acuity *La Clinique Ophtalmologique*, 10 mars, 1910.

(19) Fleischer, B.—On the relations of Mikulicz's disease to tuberculosis and pseudo-leukæmia. (Ueber Beziehungen der Mikulicz'schen Krankheit zur Tuberkulose und Pseudoleukæmia.) *Klin. Monatsbl. f. Augenheilkunde*, März, 1910.

(20) Trebilcock, Frank C.—On the astigmatic dial. *Canada Lancet*, March, 1910.

(21) Rönne, Henning.—Herpes corneæ menstrualis. *Klin. Monatsbl. f. Augenheilkunde*, März, 1910.

(22) Jose de Jesus Gonzalez.—Visual hallucinations in a patient with senile cataract: disappearance after operation. *Ophthalmology*, April, 1910.

(1) A child of seven years presented blepharochalasis of each upper eyelid, together with a cleft of the uvula and soft palate. The curious condition of the eyelids had existed "for a long time," but whether it was congenital **Stephenson** (London) was unable to ascertain.

(2) **Westhoff**, of Java, recounts the interesting case of a man who contracted gonorrhœal conjunctivitis, and who, towards the end of the successful treatment of this condition, developed a febrile disease which lasted for about four weeks. This fever was at first considered malarial, but it was not of the typically intermittent type, nor did it yield to large doses of quinine. In spite of this, the quinine was continued and the high temperature controlled with aspirin and antipyrin, also in moderately large doses. As the fever got better, the man complained of indistinctness of vision and complete inability to read, and, on examination, the discs and fundus generally were normal, thus negativing the idea of a quinine amblyopia, which was at first thought of. Two days later, he was found to have a complete ophthalmoplegia —both internal and external—of both eyes, V. $= \frac{5}{12}$ c. + 1.5 $= \frac{1}{6}$ c. + 4.5 Sn. 0.5. There was also weakness of the motor division of the fifth nerve, and his pulse averaged 106. Otherwise, nothing abnormal could be detected. He was treated for a few days with digitalis, which reduced the pulse-rate to 92, and was given sodium iodide in 7.5 grain doses. He gradually improved, and in about six weeks all evidence of his paralysis had disappeared, and one year late V. = 6/6.

The question is as to the cause of this paralysis. There was no history or evidence of syphilis, nor was there any evidence of a gonorrhœal blood infection. The disease was not malarial, but probably typhoid, which is not infrequent in Java. The administration of the unusually large doses of quinine and antipyretics caused an accumulation of typhoid toxin in the body, with the resulting paralysis of these cranial nerves. A. Levy.

(3) **Langenhan** (Berlin).—Cholestearin crystals are common in the lens, whereas other crystals are rarely found there. Cholestearine crystals are most frequent in complicated and hypermature cataracts. They are rare in partial and immature cataractous lenses. The only case so far reported in which these crystals were present in infantile congenital cataracts is that published by Allemann in 1897 (*Trans. Amer. Ophth. Soc.*, p. 142).

The present case is a boy 4 years old. Both lenses were cataractous, only the periphery of each lens being clear. In each were numerous cholestearine crystals. The condition is illustrated by a painting of the lens.

T. Harrison Butler.

(4) Wehrlin* has shown how rapidly and easily bacteria can pass down a moist arm and hand to a moist instrument and so can infect a wound in the eye. **Rediger** tells us how, in consequence, the instruments used at Marburg are sterilized in steam and then used dry. The conjunctival sac is dried out with sterilized wool wrapped round glass rods, and the hands are dried with sterilized towels. It is interesting to hear that the Marburg clinic, in common with many other ophthalmic clinics in the civilised world, is doing these things. T. Harrison Butler.

(5) **Kalish's** paper constitutes an excellent brief summary of the eye changes in Bright's disease. These include, not only the intraocular changes which often lead to recognition of the malady, but such easily-observed changes as recurrent subconjunctival and subcutaneous hæmorrhages. External ophthalmoplegia sometimes occurs early in the course of renal disease, and is notable from the fact that recovery is rapid; but relapses are

* See The Ophthalmoscope, 1909, p. 263.

common, and the muscles may be successively involved. Albuminuric retinitis may complicate any form of renal disease, even the acute varieties, as in scarlet fever or in pregnancy. Rarely, it is found in carbuncle, diphtheria, erysipelas, the intermittent fevers, measles, small-pox, typhus, and in poisoning by alcohol, cantharides, croton oil, or lead. As regards prognosis, the writer agrees that while the very poor die within the two-year limit, those under good hygienic surroundings may live for a longer period.

ERNEST THOMSON.

(6) The cases observed by the authors show that dyschromatopsia is not less a sign of brain tumour (or, possibly, any other cause of increased intracranial tension) than of hysteria The usual early return to normal relations after pressure symptoms have been relieved, exclude the diagnosis of functional disturbances on the top of the organic lesion. As in hysteria, the most marked colour change is in the blue field. The cases observed were fifty-six in number, and the results recorded were based on the first examination, often before any diagnosis of tumour had been certified. Interlacing of colour lines was the predominating feature in 25 cases, colour inversion in 9, hemiachromatopsia without corresponding change in the form field in 4, blue scotomata in 3, blue blindness in 3, green blindness in 1, complete achromatopsia in 5, and no colour change whatsoever in 6. Only 18 cases showed definite form changes. In four of the cases in which the colours interlaced, tumours were found though there was no choked disc. In 41 out of 42 cases examined subsequent to operation, whether palliative or radical, the colour lines became restored to their normal relative positions.

ROSA FORD.

(7) **Frenkel** extracted a cataractous and dislocated lens in its capsule through an incision 2/5th of the corneal circumference made at the limbus (with iridectomy), by means of a Taylor's vectis. There was no loss of vitreous and the visual result was 2/3 and de Wecker 1 with correction. Encouraged by this result, he operated on the same lines on the second eye, the cataract in which was not mature, but without iridectomy. There were no complications and the visual results were the same as in the first eye.

J. JAMESON EVANS.

(8) **Kümmel**, with a view to determine syphilis or tuberculosis as the cause of interstitial keratitis, submitted 13 cases to the test of Wassermann's reaction and 11 of these cases also to injections of increasing doses of old tuberculine (1/10 to 5 milligramms.) The results were striking: Wassermann's reaction was positive in all 13 cases, although in 4 of them history and clinical symptoms suggested rather a tuberculous origin for the keratitis. On the other hand, the injections of old tuberculine for diagnostic purposes, proved also positive in the 11 cases which were thoroughly tested by that method. In this dilemma, Kümmel attaches the greater weight to Wassermann's reaction.

C. MARKUS.

(9) In a letter to the Editor of the *Lancet*, **Lawford** calls attention to the danger involved in the employment as motor drivers of men who have a serious visual defect. If we mistake not, it is possible in the present state of the law for an absolutely blind man to obtain a driving licence.

(10) In the case here reported there was mixed astigmatism in one eye, the best correction of which was obtained by the use of crossed cylinders whose axes formed an angle of 80° with each other. The astigmatism was not accounted for by any visible pathological change in the cornea. **Pannell** thinks that some of the cases of astigmatism in which the cylinder is not tolerated may belong to this class.

A. J. BALLANTYNE.

(11) **Kuntz** concludes that the so-called sixth sense (which is, according to him, an absurd misnomer), better designated touch at a distance (*tact à distance*), is a function of the skin, a tactile sense. Those interested in the blind and their ways should read the article. ERNEST THOMSON.

(12) **Webster Fox** (Philadelphia) tells what has been and is being done in his own and other countries, to encourage the training and employment of the blind as masseurs. In Japan the blind have practised massage for over a thousand years, and it has even been proposed to grant them a monopoly of the practice. We learn that in this country thorough training and careful supervision are carried on under the auspices of the National Institution for Massage for the Blind, with headquarters in London, which has sent out more than sixty graduates. Edinburgh and Manchester are also mentioned as places where the blind are educated in the art of massage. The author thinks that the blind are unusually well qualified to undertake such work, and recommends the development of the practice in America. He attributes its success in this country to the direct interest taken in the movement by members of the medical profession. A. J. BALLANTYNE.

(13) **Howe** removes the double refracting prism of the ophthalmometer, thus converting it into a simple telescope. He then places a small light immediately above or below the tube. When the patient, with the head in the usual position, looks into the tube, the observer sees two images of the light, one from the anterior surface of the cornea, the other from the posterior surface of the lens. The fact that these two images are not seen in the same vertical line shows that the optic axis does not coincide with the visual axis. By directing the patient to turn the eye to one or other side a position of the eye is arrived at in which the lens image is vertically below the corneal one. The angular displacement of the axis from the primary position is the measure of the angle alpha. A. J. BALLANTYNE.

(14) This is an account, by **Nagel**, of a case of aortic aneurism, in which the ophthalmoscope detected segmentation of the blood column in some of the veins. There were other abnormalities, including optic atrophy, and exudative and degenerative patches in the retinæ. A. J. BALLANTYNE.

(15) **Head**, of London, reports the following case:—E. L., female, aged 23. At 6 years old she went blind, and was sent to a school for the blind. Here she was taught to read and to make baskets. At the age of 20 she began to degenerate mentally, and developed epileptiform convulsions, which have gradually increased in frequency. She has now lost the power of reading; and although she can plait baskets, they are no longer of standard size, and the plaiting is irregular. She has become very excitable and emotional. Face and tongue are a little tremulous, the reflexes are brisk, but there is no paresis. Primary optic atrophy is present in both eyes. Her teeth show defective enamel, and there are scars at the angles of the mouth.

(16) **Rönne's** patient presented the typical signs of pressure stasis after a violent compression of the chest in a lift accident. Neck and head were enormously swollen, of a dark-blue colour, the face was nearly black. The skin of these parts was covered with petechiæ, and there were extensive submucous hæmorrhages in the mouth and under the conjunctivæ. Slight exophthalmos was present, but the fundi were perfectly normal, the discs showing well-marked physiological cups. On the following day, the patient complained of a cloud before the left eye, which became blind in the course of three days, the ophthalmoscope still showing no changes. A slight and transitory visual disturbance occurred in the right eye, in which a streaky retinal hæmorrhage was discovered near the disc eight days after the accident. Gradually and slowly the left optic nerve assumed an atrophic appearance, and this was

accompanied by an extension of the central cup until at last a deep "glaucomatous" excavation of the upper half of the disc was manifest. Emphasis is laid upon the appearance of such an excavation in the absence of glaucoma, as the result of simple atrophy. The latter was probably due to extravasation of blood in the substance of the optic nerve. C. MARKUS.

(17) **de Lavigerie's** case was one of tear of the choroid limited to that membrane, associated with persistent mydriasis without paralysis of accommodation. The cause was a blow on the eye with a ball of earth thrown by a schoolmate. Immediately after the accident vision was reduced to counting fingers at two metres. Later on V. A. came to normal with very slight concentric constriction of the field. The author attributes the serious loss of vision at the beginning to commotio retinæ. The persistence of mydriasis is noteworthy from the medico-legal point of view. ERNEST THOMSON.

(18) The contribution of **Deschamps** to the discussion as to test-types should be read in the original. ERNEST THOMSON.

(19) On the strength of four cases observed by himself and of others reported in literature, **Fleischer** characterises Mikulicz's disease as a modified tuberculosis of the affected glands (See THE OPHTHALMOSCOPE, 1907, p. 165, and 1908, p. 172). He does not go so far as to claim a uniform ætiology for all cases of symmetrical swelling of the lacrymal and salivary glands, pseudo-leukæmia especially often appearing as the underlying disease But in this respect it is of great interest that some pathologists have recognised the tuberculous nature of certain cases of pseudo-leukæmia. Thus concludes Grawitz, "that there exists a general tuberculous swelling of the lymphatic glands with a tendency to lymphatic metastases which shows the typical clinical picture of pseudo-leukæmia and that this specific glandular affection is probably at the basis of very many cases of pseudo-leukæmia."

C. MARKUS.

(20) **Trebilcock**, of Toronto, is of opinion that the use of the astigmatic dial, together with the "fogging" system, is too much neglected among ophthalmic surgeons. He has invented a dial much like that introduced many years ago by Brudenell Carter, except in the particular that the patient revolves the appliance himself instead of allowing the surgeon to do so.

SYDNEY STEPHENSON.

(21) **Rönne** illustrates the interesting connection between menstruation and herpes corneæ by recording the following case in a woman, aged 42 years.—The last four menstruations, which were scantier than usual, were followed after a lapse of five days by epiphora, redness, and pain in the right eye. The ocular attacks lasted two to seven days. On one occasion the eye was examined with the corneal microscope, and the whole surface epithelium was found to be raised in small vesicles. No note is made as to the sensibility of the cornea. C. MARKUS.

(22) The subject discussed in connection with **Gonzalez'** case is an interesting one, but the paper does not lend itself to abstracting.

A. J. BALLANTYNE.

CORRESPONDENCE.

While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.

A MODIFICATION OF THE METHOD OF PERFORMING ADVANCEMENT OF THE TENDON IN STRABISMUS.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

Referring to the letter of Mr. R. Williams, published in THE OPHTHALMOSCOPE of May last, I am sorry if I have appeared to claim priority in the modification of the operation of advancement. I am also sorry not to have seen the papers published by Mr. Williams on this subject. My only reason for writing was having had success with the simple method I described, and seeing the (to me) more complicated operations still described in the text-books available here, I thought that I might be doing a service by calling attention to this simpler method.

I am, Sir,
Your obedient servant,
J. AUGUSTUS LEA.

GRAHAMSTOWN, CAPE COLONY,
June 13th, 1910.

BOOK NOTICES.

Accidental Injuries to Workmen with Reference to Workmen's Compensation Act, 1906. By H. NORMAN BARNETT, F.R.C.S.—**With Article on Injuries to the Organs of Special Sense.** By CECIL E. SHAW, M.A., M.Ch., M.D.—**And Legal Introduction.** By THOMAS J. CAMPBELL, M.A., LL.B. Rebman, London 1909. Price 7s. 6d. net.

This work is the first complete treatise published on accidents and their results relative to the Workmen's Compensation Act of 1906. Every aspect of the question has been dealt with except details of treatment, which have been intentionally omitted, so as to keep the size of the volume within reasonable proportions. Dr. Cecil E. Shaw contributes a chapter on injuries to the organs of special sense; twenty pages being devoted to injuries of the eye and seven pages to injuries of the ear. In this very limited space it cannot be expected that the subject can be exhaustively treated, and it must be assumed that the chapter has been introduced more for the edification of the general practitioner than for that of the ophthalmologist and aurist. It is for this reason, no doubt, that seven pages are devoted to the description of the usual routine methods of the examination of the eye. The ophthalmic subjects dealt with are blows on the eye, burns, abrasions and superficial wounds, perforating wounds, foreign bodies in the eye, sympathetic ophthalmia, the loss of one eye, and simulated blindness. Not only is the number of injuries dealt with very limited, and described very briefly and superficially, but the author's language is often ambiguous, as shown in the following sentence, which refers to effusion of the blood under the conjunctiva.—"But if it is far back in the eye, and seems to appear forwards, then it may be due to bleeding in the orbit from a fracture at the base."

The book, however, contains much that is of interest and service to the ophthalmic surgeon, apart from the chapter on injuries to the eye; and the legal introduction by Mr. Campbell should be read by every one who may be called upon to give expert evidence in cases of injury. Ophthalmologists will also find much interesting and serviceable information in Chapter IV, on making reports and giving evidence; in Chapter V, on industrial diseases as accidents; in Chapter XII, on injuries to the nervous system; and in the appendices on The Workmen's Compensation Act of 1906; list of scheduled industrial diseases; report of the Departmental Committee on compensation for industrial diseases.

Ueber die Schädigungen des menschlichen Sehorganes durch stumpfe Traumen des Schädels wie des Augapfels. (On diseases affecting the human eye through non-penetrating wounds of the skull or globe.) By Dr. Rudolf Birkhauser, Assistant Surgeon to the University Eye Hospital, Berne. Basel: Emil Birkhäuser, 1909.

This extremely interesting monograph, on a subject which has hitherto received less attention than it deserves, is contained in a large quarto volume illustrated with numerous beautifully finished coloured drawings by Professor Siegrist and several very fine microphotographs by the author. It is divided into three parts. Part I contains an account of diseases affecting the eye through non-penetrating wounds of the adnexa bulbi or the skull in any spot. Thus, he gives an example of a man who received a fracture of the right upper jaw, and subsequently suffered from chronic dacryocystitis. Many cases follow to illustrate the proposition that a blow on any part of the skull may lead directly to fracture of the base of the skull and rupture of the chiasma accompanied by either immediate total blindness of both eyes or of half the field of each eye, or double-sided amblyopia. In other cases the nuclear region alone is affected, giving rise to paralysis of the abducens and facial nerves. A third list of cases illustrates how injuries to any part of the orbit may result in the curious disease known as traumatic enophthalmos, by which the eye is drawn back into the orbit. Part II illustrates the various diseases of the eye which follow or accompany non-penetrating injuries of the globe. The author points out that in addition to the local injury caused by the blow, other parts of the eye may be ruptured—not to be explained by *contre-coup* as is usually stated in the text-books, but from the hydrostatic law that pressure applied to a fluid acts equally in all directions, by which the weakest part gives way. Since the contents of the eye are practically incompressible, a violent blow at any spot on the outside of the eye will often lead to rupture of one or other of the coats, causing hæmorrhages, detachment of the retina or choroid, or actual bursting of a hydrophthalmic eye. These facts are illustrated by coloured drawings. In the same way the well-known excavation of the macula is attributed directly to hydrostatic pressure engendered by a blow on the outside of the globe. In most cases one may observe a round intensely red cavity in the retina itself, embracing the entire foveal pit, due to a local effusion (hydrops) of the fovea, which bursts the thin retina at this spot, with subsequent retraction of the retina round the hole pierced, and intense congestion of the choroid immediately behind it. Again, detachment of the retina may follow a blow. It may be traced either to an outpouring of serum fluid behind the retina, or else to a rupture and consequent hæmorrhage from a choroidal vessel. Mydriasis, myosis, and paralysis or paresis of the accommodation are shown by numerous cases frequently to follow blows on the eye. Part III is devoted to

answering Dr. Perlia's query, "Can an injury to or a blow on the eye set up a local manifestation in the eye of a constitutional affection or other disease which is latent?" This is by far the most interesting and important section of his work, and he is able abundantly to answer the question in the affirmative. Thus, he shows by numerous cases that the eye of a person affected with tubercle or with a scrofulous or tuberculous taint, or suffering from inherited or acquired syphilis, will frequently show signs of tubercle, syphilitic iritis, or parenchymatous (interstitial) keratitis, within a week or two after a contusion or other injury to the organ. Of course, every surgeon must have observed such cases, and instances have been recorded by Billroth, Schulze, Notnagel, Gerhard, Zeissel, Bamberger, v. Hippel, Perlia, Guillery, and many others, but we doubt if the subject has ever been so exhaustively dealt with before. It is unnecessary to give examples, but it will well repay the ophthalmic surgeon to study, and specially do we commend this section of the monograph to the attention of medical men attached to railway and insurance companies, so that they may reserve their judgment on injuries *not merely to the eye, but to any part of the body*, in persons suffering from latent constitutional disease.

GEORGE LINDSAY JOHNSON.

Ophthalmic Surgery: A Treatise on Surgical Operations pertaining to the Eye and its Appendages, with chapters on para-operative technic and management of instruments. By CHARLES H. BEARD, M.D., Surgeon to the Illinois Charitable Eye and Ear Infirmary, etc. London: Rebman, Ltd. 1910. Price 22s. net.

There are already not a few good text-books on the surgery of the eye which compete for the favour of the ophthalmic surgeon, but we feel confident that this, the latest of them, will, ere long, win for itself a place in the front rank. The author writes with a fluency of style, which, it is true, sometimes assumes a freedom which few English writers would allow themselves, but which is not altogether a drawback in treating a subject which is apt to make somewhat dry reading. Even more startling than such sallies as his references to the "muscle-snippers," as he calls those who indulge in indiscriminate tenotomies, and somewhat of a shock to the eye and ear, are words and expressions like, "frazzles," "yanks," "rool," "skillet," "nub," "scarey," "flare," "cluttered," "recidivations," and "a lot of junk." Even many more familiar words assume a somewhat unusual form, for example, cauterisms, beneficient, axile, acromegalian, connate, and absorptivity.

Although the type and style of the book are excellent, the reading of the proofs might have been more carefully done. One does not have to look far for printer's errors, and such mistakes as "inversion" for "eversion" and "exophthalmos" for "enophthalmos" occur fairly often. Several times the patient is said to be prone when supine is meant, and he is even spoken of as "prone upon his back." Rather a curious error occurs on pages 232 and 243, where N. Bishop Harman is scarcely recognisable as "Bishop, of Cambridge," and figure 106, illustrating his gold chain method for ptosis, is labelled "Bishop."

As regards the subject matter of the book, it would, of course, not be difficult to point out omissions. For example, we miss, in the very detailed section on *technique*, references to the sterilisation of local anaesthetics, methods of instilling drops, and the optimum temperature of the solutions. Nor does the author seem to mention regional anaesthesia of the eyeball by the injection of cocaine in the neighbourhood of the ciliary ganglion. Blistering, too, might have found a place beside leeching as a measure of proved value.

These are omissions of minor importance. It is difficult, however, to understand the absence of any reference to the newer operations for glaucoma, some of which have now been on trial for over three years. This is all the more remarkable as Dr. Beard devotes a paragraph to sclerectomy, in which he speaks of the older trephining operations of Argyll Robertson and others, but he says "of late years sclerectomy has been mainly employed in detachment of the retina."

But when all has been said that can be said by way of criticism, the work leaves only the most favourable impression. It is not by any means a mere catalogue of operations and their variants: it rather impresses one as the work of a surgeon with a wide personal experience of the procedures he describes. For this very reason it is difficult to single out parts that are specially good. The book opens with a valuable section dealing with the choice and the care of instruments, methods of sterilisation, the application of dressings and bandages, narcosis, and other details of surgical *technique*. This section is well done. All through, the apparently trifling details, on which so much of the success of ophthalmic surgery depends, are given due attention. We do not remember to have heard before of the "netting" bandage used at the Illinois Eye and Ear Infirmary, which is applied wet, and seems to dry with a certain rigidity, without being so unyielding as the starch and plaster bandage. It is worth bearing in mind that there may be occasions on which such a bandage would be a useful compromise between the soft gauze bandage and any of the rigid protection shields.

In treating of the different operations in the main section of the work, the author devotes a few words to the history of each operation. The indications and contra-indications, the risks, the complications and their treatment all claim a share of attention. The anatomical relationships involved are called in to explain the relative advantages of the various operations and their modifications. We notice this perhaps more especially in the sections dealing with operations for ptosis, entropion and ectropion, trichiasis, &c., which most text-books describe with little attempt at classification. The author's descriptions seem to help the reader to grasp the true "inwardness" of the different procedures.

Due prominence is given to the author's preferences and to the description of operations which are more distinctly his own, but without disturbing the balance of the work as a whole.

The concluding chapter, of some forty pages, is devoted to the consideration of the removal of foreign bodies from the eye, and the use of the electro-magnet and the x-rays.

Some special mention should be made of the illustrations, the majority of which seem to be the author's own. The line drawings, which are largely employed in the illustration of advancement operations, operations on the lids etc., are uniformly clear, and always explain the points they are intended to illustrate.

The half-tone blocks include many photographs of operator and patient in the various stages of such operations as enucleation and the extraction of cataract. They seem to be clever examples of what the author would no doubt describe as "fake" photographs. The same gentleman appears as the obliging victim of a large variety of operations on the lids and eyeball. One is a little surprised, by the way, to notice that in removing a foreign body from the cornea the hands of the operator are fully occupied in fixing the lids and manipulating the spud, and that he "gets an assistant or the patient (!) to hold the lens" which gives the focal illumination.

From what has been said, it will be gathered that, in spite of certain minor

flaws, which can be easily remedied in future editions, one can confidently recommend Beard's manual as a valuable addition to the ophthalmic surgeon's bookshelf. A. J. BALLANTYNE.

L'Élevage de l'Œil du Liseur avant et pendant la lecture. (The bringing up or education of the eyes before and whilst learning to read and subsequently.) Par le Docteur L. ROLLAND; avec 24 figures dans le texte et 2 planches. Toulouse: *Bulletin d'Oculistique*, 21, Rue des Chalets, 1909.

This pamphlet is sensibly written and is intended partly for those who have charge of children and especially for schoolmasters. For the expert, there is not much that is new.

A normal eye the author considers must fulfil seven conditions:—

The structure and function of the optic nerve and retina must be good. The transparency of the dioptric media must be perfect. The arrangement for accommodation of the eye for objects at varying distances must be satisfactory. The cornea and lens must be free from astigmatism, or be capable of correction to a normal curvature. The dark chambers must have a form which does not prevent rays of light from affecting the peripheral portions of the retina whilst its central fovea is fixed on a point. A diaphragm (the iris) must act well. The six extra-ocular muscles must act normally.

Hypermetropes of + 1D. to + 2D. have the best distant vision, better even than emmetropes.

The visual angle was taken by Snellen to be 1′ which he thought represented the *minimum separabile*, but many subsequent observers have placed it at 30 seconds or half a degree. Some remarkable examples of hyperacuity of vision are collected, one being recorded by Rauke of the Bakairis who shoot with their arrows the fish that pass like a flash in the waters of the rapid. Cohn, examining the fishing population of Heligoland, found 9 per cent. with defective vision according to Snellen's standard, 5 per cent. with normal vision, and 86 with superior visual power; of these last 56 per cent. were between normal and double, and 30 per cent. between double and triple the normal acuteness of vision.

Hypermetropes partly owing to the form of their eyes, which preserves the texture and the sensibility of the retina, and partly owing to the form of their dark chamber, which gives them peripheral visual acuteness, have a far wider field of vision than either emmetropes or myopes, and this again supplies them with a better faculty of orientation. The small size and posterior position of the centre of motion as compared with the emmetrope and the myope secures for the hypermetrope a greater extent of excursion.

The statistics of the Braille School show that by far the largest number (110 out of 196) of blind children become blind in the first year of life and that in another series of 226, as many as 104 were blinded from disease of the conjunctiva, and 36 from diseases of the cornea.

All circumstances and conditions that dim the cornea lead to undue approximation to the eye of the letters in the first efforts at reading and hence to myopia, partly owing to spasm of the ciliary muscle, which causes traction of the choroid and troubles of nutrition of the fundus, partly to the convergence required, which leads to pressure being exercised by the internal and external recti muscles, and partly to stooping forward, which induces congestion of the whole head. To remedy or to prevent these effects of impaired transparency of the cornea, the formula has been advanced of "head and body erect."

In regard to measurement, according to A. Druault, an emmetropic eye has an antero-posterior length from the apex of the cornea to the posterior surface

of the sclerotic of 24 mm. 824, and its shape is that of a spheroid. The eye of the infant, like the rest of its body, grows, and whilst at birth the eye has about two-thirds of its ultimate size, and one-third of its final weight, its normal size is attained before the age of four years. But at birth the papillo-macular region has already obtained its full growth. In these early years the eye attains a length of 20—21 mm. and scarcely alters till the age of puberty, when it attains the length of 24 mm. 1. The hypermetropic eye of the infant having been subjected to obligatory close and hard work, has become emmetropic, which is due to diminution of the resistance of the fundus of the eye.

The effects of close, or educational, work appear from the observations of Wildmarch, who in a *lycée* containing 742 scholars found girls, aged

6—7	... ...	0 myopic
8—9	... ...	1 ,,
9—12	... ...	14 per cent.
12—14	... ...	33 ,,
14—16	... ...	54 ,,

And Toberowsky, amongst 416 scholars, found

Hypermetropes	... ...	27 per cent.
Myopes	... .	65·0 ,,
Highly myopic	... .	32·0 ,,

Dr. Rolland distinguishes four stages of myopia. The first is the passage of the hypermetropic eye of the young child into emmetropia. The second stage he names *myopie hemiaphorique;* if this is due to spasm of the accommodation, the employment of atropine will render the eye emmetropic. The third stage is posterior staphyloma, characterised by peripapillary crescent or conus. The fourth stage, which is irremediable, is atrophy.

The normal sclera, as a rule, becomes progressively thicker from infancy to old age. In myopia it becomes thinner, and while it normally increases from before backwarks, in the myopic eye the opposite obtains, especially on the temporal side.

The conclusions Rolland draws are that before the child begins lessons the greatest care should be taken to guard him or her from injuries of all kinds that may damage the cornea and lead to alteration of its curvation and from the various conjunctival diseases. Whilst engaged in book work, writing, sewing, and the like, every care should also be taken to prevent the too close approximation of the eyes to the work. On leaving school, they should regard distant objects to relieve strain. HENRY POWER.

NOTES AND ECHOES.

Honour. Mr. R. BRUDENELL CARTER, who retired from the active practice of ophthalmology some few years ago, has been promoted to be Commander of the Order of Saint John of Jerusalem.

* * * *

Appointments.

Mr. Percy Flemming has been appointed lecturer in ophthalmology at the London School of Medicine for Women (Royal Free Hospital).

Dr. John Wharton has been appointed visiting ophthalmic surgeon to the Chorlton Union Hospitals, Manchester.

Dr. George Mackay has been continued in office as senior ophthalmic surgeon to the Edinburgh Royal Infirmary for an extra period of two-and-a-half years. Dr W. G. Sym, junior ophthalmic surgeon to the same institution, has been re-appointed for a second term of five years.

Mr. H. Pinto-Leite has been appointed clinical assistant at the Royal London Ophthalmic Hospital (Moorfields).

* * * *

Bristol Eye Hospital.

As the result of the centenary fête described in these columns last month, the funds of the Bristol Eye Hospital have benefited to the extent of £1,678.

* * * *

Continental Items.

Professor Wagenmann, of Jena, has accepted a call to Heidelberg in succession to Professor Leber. The imminent resignation of Professor Ernst Fuchs, of Vienna, is announced. Dr. A. F. Terrien has been appointed *professeur agrégé* of ophthalmology in the Paris faculty. Professor M. Tscherning has been nominated professor of ophthalmology and director of the ophthalmic department of the Copenhagen State Hospital. Dr. Karl Wessely, assistant in the Würzburg University *Augenklinik*, has received the title and rank of extraordinary professor of ophthalmology. Dr. G. Ovio, of Modena, has been nominated extraordinary professor of ophthalmology Dr. A. A. Maklakow, of Moscow, has been nominated ordinary professor of ophthalmology in that city.

* * * *

"Dr." Crippin.

The notorious "Dr." Crippin, who is suspected of a revolting crime in Holloway, is at this moment badly "wanted" by the police. The hue and cry is in full progress. The sleuth hounds of the law are even now upon his track. A substantial reward has been offered for his apprehension, accompanied by his description, from which we cull the following, as being of some little interest to ophthalmic surgeons:—"May obtain a position as assistant to a doctor or eye-specialist, or may practise as an eye-specialist, dentist, or open a business for the treatment of deafness, advertising freely."

* * * *

Dr. Liebreich

Dr. R. Liebreich, who now resides in Paris, celebrated the completion of his 80th year on June 30th last.

* * * *

The Ophthalmological Society.

The following were the office-bearers elected at the Annual General Meeting of the Ophthalmological Society, held on July 8th, 1910: President: G. A. Berry. Vice-Presidents: Gustavus Hartridge, Joseph Nelson (Belfast), James Taylor, M.D., J. C. Uhthoff (Brighton), J. Tatham Thompson (Cardiff), T. H. Bickerton (Liverpool), Ernest Clarke, W. T. Holmes Spicer Treasurer: J. B. Lawford. Librarian: W. T. Holmes Spicer. Council: Arnold Lawson, William G. Laws (Nottingham), A. Maitland Ramsay (Glasgow), F. E. Batten, M.D., J. H. Parsons, C. H. Usher (Aberdeen), W.

W. Sinclair (Ipswich), J. Herbert Fisher, A. Hugh Thompson, G. W. Roll, A. W. Ormond, F. Menteith Ogilvie (Oxford). Secretaries: E. Farquhar Buzzard, M.D., E. Brewerton.

* * * *

Hunterian Professorship.

DR. F. W. EDRIDGE-GREEN, Beit Memorial Research Fellow, has been appointed Hunterian Professor for the ensuing collegiate year at the Royal College of Surgeons of England. Congratulations to our distinguished correspondent!

* * * *

Heidelberg Ophthalmological Society.

THE Society will assemble at Heidleberg on August 3rd next, and continue its meeting on the 4th, 5th, and 6th. The programme is unusually full, since there are no fewer than forty-nine communications and twenty-six demonstrations. Not a single English name and but one American name appears in the long list.

* * * *

American Ophthalmological Society.

AT the annual meeting held on May 13th, at Washington, Dr. Emil Gruening was elected president, Dr. Edward Jackson, vice-president, and Dr. W. M. Sweet, Secretary-treasurer of the Society.

* * * *

Medal of the International Ophthalmological Congress.

BEST congratulations to Dr. Thomson Henderson, of Nottingham, to whom has been awarded the de Vincentiis medal of the International Ophthalmological Congress, for his researches upon glaucoma. The title of Dr. Henderson's communication was: "The *Rationale* of Iridectomy in the Treatment of Glaucoma: an anatomical, physiological, and pathological research."

* * * *

Oxford Ophthalmological Congress.

THE Congress met at Keble College, Oxford, on July 21st and 21st last, about one hundred members foregathering. The proceedings were officially opened on the morning of the 21st with an address by Professor William Osler, delivered in the theatre of the department of physiology. The theatre was packed with an enthusiastic audience to listen to the professor's wise and witty remarks upon our department of medicine. Professor Osler was followed by Professor Arthur Thomson, who demonstrated in his inimitable way and illustrated by lantern slides the "*sulcus circularis corneæ*," a groove which he has observed to lie, just at the sclero-corneal junction, around the circumference of the anterior chamber. His address, with illustrations, will be published in an early number of THE OPHTHALMOSCOPE. Dr. Mackenzie Davidson, of London, and Dr Holth, of Christiania, next demonstrated their methods of localising foreign bodies in the eye by means of X-rays. The afternoon was devoted to the demonstration of operations by Sir Anderson Critchett,

Professor Lagrange, Professor Heine, and Mr. R. W. Doyne. During the evening the inaugural dinner of the Congress was held in Keble Hall under the chairmanship of Sir Anderson Critchett, the Vice-Chancellor of the University of Oxford being the chief guest.

On the following day (22nd) Professor Poulton gave a most suggestive address dealing with mimicry in butterflies as indirect evidence of a general resemblance between human vision and that of the higher animals. He was followed by Dr. G. Stanculeanu, of Bucarest, who dealt with "Anaphylaxis of the Eye," and whose remarks we hope to publish in THE OPHTHALMOSCOPE shortly. Mr. Priestley Smith then gave an address on "Glaucoma Problems," which was well received by an interested audience. In the afternoon Dr. Holth and Mr. H. Herbert demonstrated their respective operations for glaucoma, while Major Gidney, I.M.S., operated upon three cases of cataract by the intra-capsular method.

Many interesting "side-shows" were on view during the Congress, among which may be mentioned Batten's hydrophthalmoscope and orbital eyeglass frames, W. H. Brailey's drop bottles, T. Harrison Butler's new squint hook and operating table, Professor Gotch's ingenious instrument for determining the near-point by means of chromatic aberration, Harman's new diaphragm test, Doyne's tonometer, Henderson's models to illustrate the circulatory nature of the intra-ocular pressure in the normal and glaucomatous eye, Secker Walker's models to show the passage of rays of light in various forms of ametropia, and Whitnall's beautiful dissection of the orbit. In addition to these, Mr. R. J. Coulter demonstrated cases of miner's nystagmus, Dr Edridge-Green and Dr. Burch, colour-vision, Mr. Bernard Cridland, the working of Schiötz's tonometer, and Mr. Wingfield, the Wassermann test for syphilis. Mr. Bull showed an interesting collection of antique eye-glasses and spectacles, as well as a series of pictures to illustrate the same subject.

The museum contained exhibits by the well-known firms of Messrs. C. W. Dixey, Messrs. E. B. Meyrowitz, Messrs. Weiss, Messrs. George Culver, the Uni-Focal Company, etc.

* * * *

The Oxford Diploma in Ophthalmology.

THE following were the papers set at the examination for the Diploma in Ophthalmology, recently instituted by the University of Oxford:—

EXAMINATION FOR THE DIPLOMA IN OPHTHALMOLOGY. OXFORD.

Tuesday, July 19th, 1910. 11.30 a.m.—1 p.m.

Relation of Ophthalmology to General Medicine.

1. Mention the varieties of Hemiopia due to intracranial disease. In a case of left homonymous hemiopia, where may the lesion be situated? What conditions would help in localization of the lesion?

2. Describe briefly the affections of the eye met with in connexion with Diabetes mellitus.

3. Describe briefly the lesions of the eye which may result from disease involving the Gasserian Ganglion.

Tuesday, July 19th, 1910. 10—11.30 a.m.

Dioptrics.

1. Explain the formation of the image of the fundus oculi seen in Ophthalmoscopic examination, (*a*) by the indirect method, (*b*) by the direct method. What degree of magnification (approximately) is obtained by these two methods, and upon what does its amount depend?

2. Describe the principles upon which Snellen's test-types are constructed.

3. What is the visual line of an eye? Explain its relation to the optic axis (at the cornea) in Emmetropia, Hypermetropia, and Myopia. What is meant by the angles γ and κ, and what use can be made of them in clinical examinations?

Tuesday, July 19, 1910. 2—5 p.m.

Pathology.

1. Describe the characters of the Morax-Axenfeld bacillus. To what affections of the eye may it give rise?

2. Describe the changes which occur in the healing of an uncomplicated wound of the cornea.

3. Describe the microscopic appearances of a section of the choroid in Sympathetic Ophthalmitis.

4. Describe the macroscopic and microscopic appearances of Glioma of the Retina.

5. Discuss the pathology of Glaucoma secondary to Iritis.

6. What are the pathological conditions underlying (*a*) positive scotoma, (*b*) negative scotoma?

Wednesday, July 20, 1910. 10 a.m.—1 p.m.

Diagnosis, Etiology, Treatment, &c.

1. What is the etiology of Ulcus Serpens Corneæ? Give a clinical description of a case and state the treatment you would adopt.

2. Enumerate the causes and discuss the differential diagnosis of unilateral proptosis.

3. Describe a case of Acute Retro-ocular Neuritis. Give the causes, treatment, and prognosis.

4. Describe fully an operation for Entropion due to Trachoma, and one for Extirpation of the Lacrymal Sac.

5. Give in detail the methods of examination you would employ and the evidence you would expect to find in a case of incipient glaucoma.

6. A man presents himself with a wound at the sclero-corneal margin and prolapse of iris. He states that on the day before, while chipping stone with a chisel, something flew up and struck his eye. Describe the line of treatment you would adopt.

THE

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ORIGINAL COMMUNICATIONS.

THE GROSS ANATOMY OF THE FILTRATION ANGLE OF THE HUMAN EYE.

BY

ARTHUR THOMSON, M.A., M.B., F.R.C.S.,

PROFESSOR OF HUMAN ANATOMY IN THE UNIVERSITY OF OXFORD.

IN the various text books, both anatomical and ophthalmological, the descriptions given, and particularly the figures supplied in illustration of the arrangement of the structures around the filtration angle, differ so much, that we are naturally led to suspect that, if they be true to nature, the relation of the parts must vary considerably.

Most of the illustrations of this region have been taken from thin microscopic preparations. Although the handling and mounting of these sections naturally tend to disturb the normal relations, so that they cannot be relied on to represent the appearance in the undisturbed condition, it is on such specimens that the generally accepted account has been based, and from these also the explanatory figures in the text have been largely taken.

It is now generally recognised that the thickness of the cornea at its periphery is considerably greater than at its centre. The measurements of the thickness of the centre, as given by different observers, ranges from ·8 mm. to 1·37 mm.—for the periphery there is a variation of from 1 mm. to 1·55 mm. according to the same authorities. That is to say, there is, on an average, a difference of about ·2 mm. between the central and peripheral thickness. It is not always stated under what conditions these measurements have been taken, so that for the purposes of comparison the results are not altogether satisfactory.

In my own case the specimens examined, removed in most cases within two hours after death, have been first subjected to the fixing influence of a 4 per cent. solution of formol. After the completion of the hardening process, the eyes were then frozen and cut. Although advantage has not been taken of measuring the corneæ of all the specimens cut, yet I have been able to measure accurately by means of an eye-piece micrometer the cornea in 12 different eyes. My figures range from ·72 mm. to 1·4 mm. for the central thickness and 1·02 mm. to 1·5 mm. for the peripheral thickness. The average thickness of the central part works out at ·95 mm., whilst that of the peripheral portion is 1·19 mm., the difference between the average central and peripheral thickness amounting to ·24 mm. It is worthy of note that this figure is in close accord with the average difference deduced from the records of other observers, a point of some importance, since it disposes of an objection which might otherwise be raised that the appearances I am about to describe are due to irregularities in the hardening of the tissues.

Very frequently, in the diagrams of this region, no account is taken of this increase in thickness of the cornea towards its circumference, and the posterior outline of that structure, as displayed in section, is represented as an evenly flowing line, passing outwards towards the angle of the anterior chamber where it ends in becoming confluent with the anterior surface of the iris by a narrow rounded angle.

Figure 1, which is taken from a well-known text-book on Ophthalmology, represents the appearance most frequently figured. Herein neither the increase in the thickness of the cornea at its periphery, nor the thinness of the iris at its ciliary border is shown.

Figure 2 is taken from another and more recent work. The illustration, only the outlines of which are here given, is drawn from a microscopic preparation. As will be seen, the thickening of the peripheral cornea and the thinning of the iris at its attached border are well displayed, but I venture to think that the relation of these parts has to some extent been disturbed in the cutting and mounting of the section. It does, however, show what figure 1 fails to exhibit, *viz.*, a well marked convexity of the internal surface of the cornea close to its periphery, it does not however display the appearance which I have so often observed, and of which I give a diagrammatic representation in figure 3. In only one instance have I come across a nearly similar representation of the parts, and that is figured in Piersol's *Anatomy* (p. 1448, fig. 1202), but, curiously enough, although the disposition of the structures around the angle is accurately drawn in the illustration, I have failed to discover any reference to the arrangement in the text.

Fig. 1.

Fig. 2.

Fig. 3.

At first I was inclined to regard the appearance, of which I have given a diagram in Figure 3, as exceptional, but a closer examination of the specimens at my disposal confirmed me in the belief that the arrangement displayed was the more usual, and consequently to be regarded as representing the normal disposition of the parts. As will be noticed hereafter, there were preparations which exhibited a departure from the more usual conditions, but these will be dealt with later and need not now be further referred to.

My next doubt was whether the appearance displayed was artificial and produced by the action of the fixing agent, or possibly caused by *post-mortem* changes. In regard to the former, the figures, which I have already supplied relative to the measurements of the cornea in its different parts compared with these supplied by other observers, seem to disprove any such suggestion. Concerning the possibility of *post-mortem* changes accounting for the appearance, it is true that the majority of my specimens were not removed until some little time after death, but it is also significant that I have had the opportunity of examining several pathological eyes removed during life and immediately fixed, and in some of these, where the iris and cornea have not been affected, a corresponding arrangement has been observed.

With the time at my disposal, I have not been able to make an exhaustive enquiry into the literature of the subject, but so far, I have failed to light upon any description of the parts as I have found them. This, as I have already stated, I can only account for on the supposition that the region has, for the most part, been studied from microscopic sections, and not, so to speak, *in situ*, within the globe of the eye. Doubtless, however, the subject has not entirely escaped the notice of those who have devoted so much time and labour to the elucidation of the anatomy of this region. If this be the case, I welcome such evidence as further confirmation of my views, and can only express my regret that a fuller and wider recognition of their researches has not hitherto obtained.

As will be observed in figure 3, the sclero-corneal junction lies anterior to

the angle of the iris, the blunt circumference of the cornea, club-shaped in section, is bedded in the scleral tissue in such a way as to produce a marked bulge on the inner surface of the cornea, immediately in front of its union with the sclera. Behind this, the outer wall of the angle of the iris is formed of scleral tissue, less dense than that of the cornea. The ciliary margin of the iris which in ordinary conditions of the pupil, or in dilatation, is much thinner than the rest of the iris, is attached to the tissue which constitutes the annular ligament ·5 mm., or thereabouts, behind the inner margin of the sclero-corneal junction. In the interval between the sclero-corneal junction and the attachment of the iris, there is displayed in section, a distinct recess which is overhung in front by the rounded projecting rim of the circumference of the cornea. Viewed stereoscopically or studied "in the round" this recess resolves itself into a groove, which from its relation to the cornea may well be called the sulcus circularis corneæ. It is within this groove that in man the so-called pectinate ligament, continuous in front with Descemet's membrane, bridges over the interval between the sclero-corneal junction and the annular ligament to become continuous with the anterior surface of the iris around its ciliary margin.

Having thus described in general terms the disposition of the parts, it will now be necessary to consider in greater detail the relations of the structures around this region, and to discuss what seem to be the advantages of this arrangement.

Figure 4 which is a photographic enlargement of one of my specimens exhibits the disposition of the parts in its most typical form. The photograph has been taken somewhat from the front so as to show the anterior surface of the iris in perspective, note too that the anterior surface of the cornea, as well as its cut edge, is to some extent displayed. Were this not borne in mind the thickness of the cornea might appear misleading. In this preparation the actual thickness of the cornea at its centre was ·72 mm., whilst that of its periphery measured 1·05 mm. In this case the thickness of the cornea was below the average, but the influence of the peripheral thickening is well displayed; as may be seen, it overhangs the front of the angular recess, the outer wall of which, formed by the trabecular tissue overlying the sclera, measures fully ·7 of a mm. Into the angular interval formed by the bulging cornea in front and the outer wall of the angular recess, the thick bevelled-like edge of the contracted part of the body of the iris is received, though a sufficient space is left between the bevelled surface of the iris and the outer wall of the angular recess to provide for the free circulation of the aqueous humour and to enable that fluid to reach the bottom of the recess—the position of the filtration angle. The preparation also shows the relative thinness of the attached border of the iris where it becomes confluent with the fore part of the ciliary processes. A matter of some interest is to note that in this specimen the pupil is moderately dilated, its diameter measures about 3·24 mm.

Further it may be observed that on looking into the opposite side of the anterior chamber, towards the centre and right side of that space, we can see clear evidence of the groove immediately in front of the attached border of the iris, rendered apparent by the manner in which the shadow is cast by the overhanging edge of the cornea.

The next photograph, Figure 5, represents the appearance in an eye with a fairly widely dilated pupil, the diameter of which measured 5·5 mm. The central thickness of the cornea measured ·75 mm., that of the peripheral border 1·17 mm.

Here again the bulge of the cornea at its periphery is present in characteristic form, and an open angle is clearly formed by its union with the outer wall of

THE GROSS ANATOMY OF THE FILTRATION ANGLE OF THE HUMAN EYE.

BY

Arthur Thomson, M.A., M.B., F.R.C.S.

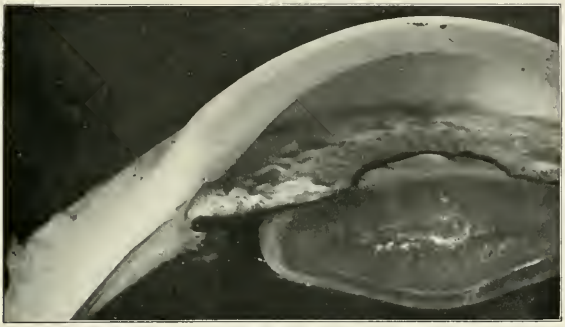

Fig. 4.

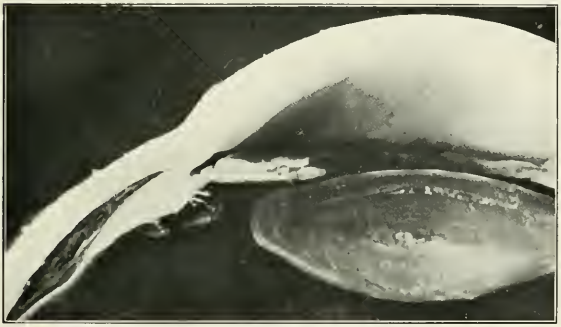

Fig. 5.

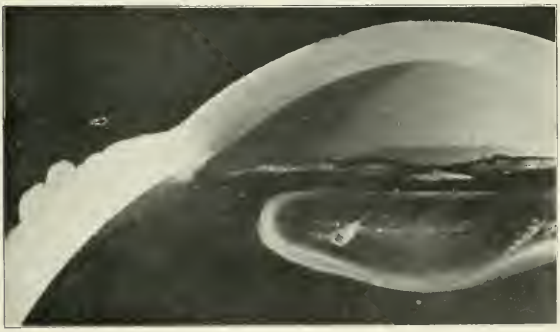

Fig. 6.

the angular recess which passes backwards and outwards towards the attached border of the iris. This view gives us an admirable opportunity of realising the advantage of this arrangement, for it is at once apparent that the bevelled circumference of the much-thickened iris is now withdrawn into the groove, much in the same way as a collapsible steel gate is pushed back into its recess. As in the former specimen, however, there still remains an interval for the free circulation of fluids between the opposite surfaces, enabling the aqueous humour to reach the bottom of the angular recess where the thin attached border of the iris is united to the ciliary body. The importance of this will be obvious if we examine the photograph, Figure 10. This gives us an enlarged view of the anterior surface of the iris. The cornea and sclera have been removed. The external surface of the ciliary body is laid bare, and the annular ligament, its attachment to the sclera having been cut through, is exposed. Just internal to the surface of the cut ligament a number of small openings are seen, separated from each other by the fibres of the pectinate ligament which reach the iris. These recesses have been described as the crypts of the iris, but a consideration of the comparative anatomy of this region will enable us to realise that these are morphologically the same as the spaces of Fontana which lie within the trabecular tissue of the pectinate ligament, where that structure is well developed, as in the horse. In that animal, the pectinate ligament bridges across the entrance of the angular recess, bounded, on the one side by the scleral tissue, and by the sloping bevelled border of the iris, on the other. In man, the pectinate ligament is but feebly represented in the adult, so that, co-incident with the regressive changes which it has undergone, the spaces within it, the so-called spaces of Fontana, have become opened out, and are in part represented by these crypts of the iris. Ranged round the circumference of the iris, these openings, be they called crypts or spaces of Fontana, are seen to lie in relation to the anterior surface of the thin attached ciliary portion of the iris, and their openings will correspond to the deepest part of the filtration angle.

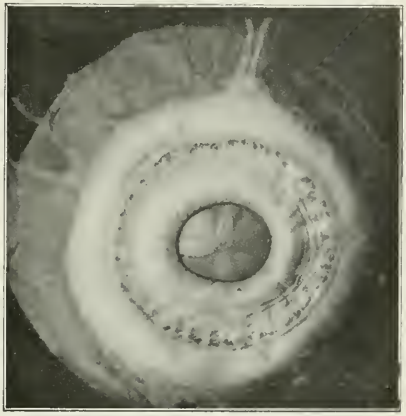

Fig. 10.

An inspection of figures 4 and 5 will render this clear.

Under ordinary conditions, and with a fairly widely dilated pupil, we have seen that fluids may have free access to the deepest part of the recess. How far an extreme degree of dilatation of the pupil, involving as it does an increase in the thickness of the iris and a retraction of its substance into the groove, will check this flow I cannot from the specimens in my possession say, but from an examination of the preparations there is ground for suspecting that the folding and creasing of the thin attached ciliary border of the iris, under these conditions, will tend to narrow if not entirely close the apertures of the so-called crypts.

Figure 6 is a photograph of an eye with a contracted pupil; in this case the pupillary aperture measured 1·75 mm. across. As will be seen, the iris is tensely stretched across the anterior chamber and much thinned, except at its pupillary margin. The appearance displayed at the filtration angle now more closely resembles that usually figured, but this, I venture to think, is explained by the fact, evidence of which seems clearly visible in the photograph, that the less dense and highly elastic trabecular tissue behind the sclero-corneal junction, together with the pectinate ligament, has been pulled inwards by the traction of the iris, forming a wedge-shaped area of tissue which, combined with a straightening of the iris due to its tension, has lead to a disappearance of the groove and recess which I have found in all the other cases I have examined.

I am confirmed in this belief by the simple, although somewhat crude, experiment of gently pulling on the iris in a specimen in which the groove and recess were well displayed. The result of the traction exercised on the iris was to produce an appearance similar to that represented in Figure 6. On releasing the iris, the elasticity of the parts was sufficient to restore them to their former condition.

As to whether or not this stretching of the iris, associated with a contraction of the pupil, exercises any effect on the orifices of the crypts or spaces of Fontana must as yet remain a moot point. It is conceivable that the tension exercised on these openings may lead to an extension of their lips, and so tend to produce an approximation of their edges, thereby narrowing or it may be closing them. I throw this out as a suggestion, the details of which must be either confirmed or denied by observations on the living.

It seems from a consideration of the evidence adduced that the nature of the "filtration angle" varies with the altered condition of the iris, changing its character, according as the pupil is contracted or dilated. It must not, however, be overlooked that alterations in the form and position of the lens may also exercise some controlling influence.

Confining ourselves, for the time being, to the changes produced by the iris, it does not appear improbable that coincident with the extremes of dilatation and contraction of the pupil, possibly the orifices of the crypts and spaces of Fontana may undergo such alterations in their form and disposition as may lead to their partial or complete occlusion, whilst in intermediate conditions, as represented in Figure 10, their apertures are free and open. It thus appears possible that the contractions of the iris under normal conditions may contribute, as it were by a kind of pumping action, to the interchange of the fluid contents of the anterior chamber with those of the system of Schlemm.

Lest the evidence of the existence of the groove produced in the figures already cited may be considered insufficient, it may be well to adduce further proof of its presence, both by the illustration of other views, and by the appearance which it presents when the parts are dissected.

As may be seen in Figure 4, where the parts are undisturbed, the groove is seen in shadow on the opposite side of the anterior chamber just in front of the attached border of the iris. Towards the left of the figure the outline of the overhanging edges of the cornea can be distinctly seen.

Figure 7 represents a view of a quadrant of the anterior half of the globe. A quadrant of the globe was selected because it is more easy to manipulate the iris in such a section than in a half. The lens has been removed, and the iris has been pulled back and stretched over the anterior ends of the ciliary processes, so as to see better into the filtration angle. The photograph gives clear evidence of the presence of the groove; although here it is rendered shallower by the tension exercised at the attached border of the iris, this is

THE GROSS ANATOMY OF THE FILTRATION ANGLE OF THE HUMAN EYE.

BY

ARTHUR THOMSON, M.A., M.B., F.R.C.S.

Fig. 7.

Fig. 8.

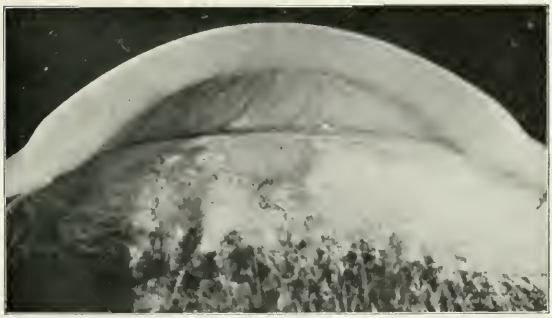

Fig. 9.

well seen at the left margin immediately in front of the cut ciliary body. The photograph also serves to illustrate how the tissue on the outer wall of the groove displays a different appearance from that presented by the posterior surface of the cornea, due, doubtless, to its more spongy character and to what in man is the representative of the pectinate ligament.

Figure 8 gives us a view of the appearance of the parts after the lens has been removed and the iris taken away. I was surprised, in making this and similar preparations, at the ease with which the iris was torn away from the so-called annular ligament. It could readily be removed with little force, and left, as will be seen, quite a clean edge.

As is shown in the photograph, there are two distinct lines in front of the anterior ends of the ciliary processes; the one, separated from the ciliary processes by a narrow interval, serves to define anteriorly the surface from which the iris has been torn away, the other line, separated from that just described by a somewhat narrower space, is clearly formed by the overhanging rounded edge of the cornea, as may be verified by tracing it to the right side of the section, where the shadow thrown by the projecting cornea emphasises it.

A further dissection is shewn in Figure 9, in which the entire contents of the globe have been removed from their connection with the sclera, the inner surface of that structure together with the cornea is now exposed. There can, I think, be little doubt that in correspondence with the inner surface of the sclero-corneal junction there is a distinct groove, produced, as has been explained, by the overhanging of the projecting inner edge of the cornea at its circumference.

If further proof be needed, it is supplied in Figure 11, which represents a view of the inner surfaces of the cornea and anterior part of the sclera, the whole of the ocular contents having been removed. Here the presence of the sulcus corresponding to the inner side of the sclero-corneal junction is proved beyond a doubt in this specimen. The lighter ring, immediately surrounding it externally, marks the position of the annular ligament from which the iris and ciliary body have been torn away.

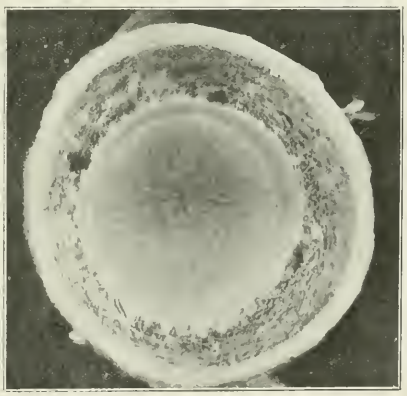

Fig 11.

To pass now from what may be termed the macroscopic appearance of the parts, if that term can be applied to structures which require a low magnification to see them clearly, it may not be amiss to study the region in microscopic sections with the object of seeing whether any evidence of the arrangement described is revealed in carefully prepared specimens.

From an inspection of a considerable number of preparations, as far as my experience goes, there is almost invariably evidence of the position of the groove; this takes the form of a kink

see figure 12) at the inner side of the sclero-corneal junction. It is easy to understand how this infolding of the structures may be obliterated by an undue elevation or separation of the cornea from the iris, or emphasised by an approximation of these parts in careless mounting, but the persistence of the kink in the situation referred to, or where the relation of the parts has been approximately maintained, seems to me to further support the existence of a groove as the normal arrangement.

FIG. 12.

It is not surprising that in the drawings made from such sections the infolding has not been represented, since it has been regarded as artificial, but an examination of a considerable number of microphotographs has confirmed me in the belief as to the correctness of the views I have already expressed.

To sum up the conclusions, at which I have been lead to arrive, I venture to think that—

1. There is strong evidence to support the view that in the normal eye there is a groove such as I have described.

2. That the appearance of the groove varies with the condition of the iris.

3. That, when the pupil is dilated, the groove forms a recess into which the thickened iris is withdrawn.

4. That, when the pupil is contracted, the traction exercised by the stretching of the iris pulls inwards the trabecular tissue at the angle of the anterior chamber, and so leads to the effacement of the groove and the recess.

5. That the movements of the iris may, as has been explained in the text, exercise some influence on the interchange between the fluid contained in the anterior chamber and that circulating in the system of Schlemm.

In conclusion, I have to express my indebtedness to my museum assistant, Mr. W. Chesterman, for the help which he has rendered in the preparation of the specimens and photographs.

THE RESULTS OF A SHORT SERIES OF SUBCONJUNCTIVAL INJECTIONS IN THE RABBIT.

BY

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Introductory Remarks.

The present research was undertaken at the suggestion of Dr. A. Maitland Ramsay. In a paper (published in the Ophthalmological Society's *Transactions* in 1906) which deals with the injection methods of treatment of detached retina, Dr. Ramsay gives the results of his own experience, and a brief outline

of these results will serve as an introduction to the present series of experiments. Out of 50 cases which occurred in hospital during a certain period (no selection of cases being made), marked improvement was met with in 10 cases, moderate improvement in 10, while in the remainder no evil effects followed the use of this, as yet, somewhat empirical treatment. The solution usually employed by Dr. Ramsay was a 1 in 2,000 bicyanide with 8 per cent. NaCl. The solution recommended by Dor[1] was followed by severe pain and sickness, and was replaced by a 1-2 per cent. dionin added to the sodium bicyanide solution. In all cases severe pain accompanied the subconjunctival injection, and had to be controlled by hot fomentations, etc. The ocular conjunctiva rises in a bleb, but this is soon replaced by diffuse œdema. On the following day the intra-ocular tension is increased, and the media are hazy, but this all passes off and the vision is generally improved. The improvement in vision seems to depend on the amount of reaction produced by the injection, being more marked in those cases in which a large amount of fluid has been injected and considerable local irritation produced. It is probable that the beneficial effect of subconjunctival injection is due to the action of the fluid as a counter-irritant.

According to Karl Wessely, the operation is followed by dilatation of the blood-vessels of the ciliary region, and the aqueous comes to contain a large amount of albumen. These results he (Wessely) considers due to the action of the injection upon the vaso-dilator mechanism of the eye as a powerful conjunctival stimulant.

It was in order that some light might be thrown upon the *modus operandi* of this method of treatment, the clinical value of which is undoubted, that the present series of experiments was instituted. How far one can correlate the results of laboratory experiments upon healthy animals with the results obtained in the course of bedside treatment of patients is always open to question. There is no doubt, however, that an estimation of the physiological effect tends to be of help in expanding our knowledge of the subject, and guiding us as to the employment of the treatment in any particular case.

Experimental Details.

Experiment 1.—Small black and white rabbit. Ether anæsthesia. Animal killed 20 hours after operation.

Method of operation.—The conjunctiva of the upper fornix was picked up with fixation-forceps, and by means of a sterilised hypodermic syringe 10 minims of the sodium-dionin-bicyanide solution were injected.

A large "blister" was produced, which was not entirely absorbed at the time of death. No pain seemed to accompany the injection, as the rabbit on recovery from the anæsthetic, apparently suffered no inconvenience.

Histology.—Fixation of operated and control in formol-saline solution (10 per cent. formaline in normal saline). Paraffin sections. Staining by Weigert's rapid iron-hæmatoxylin method.

The sections showed considerable increase in the number of cells in the subconjunctival tissue, and effusion of blood into the loose extrinsic structures of the eyeball (muscles, etc.) in the region of the hypodermic injection. The

(1) Dor's solution for subconjunctival injection :—

Sodii chloridi	grammes	5·0
,, carb.	,,	0·4
,, sulphatis	,,	0·4
,, phos.	,,	0·1
Potass sulphatis	,,	0·4
Aq. destill.	,, ad.	20·0

sclerotic and choroidal tissues were free from infiltration. The vessels of the iris seemed distinctly dilated as compared with the control. There was some exudate in the anterior chamber.

Experiment 2.—Albino rabbit. Ether anæsthesia. Killed 24 hours after operation. The solution used in this case was an 8 per cent. solution of NaCl, and 10 minims were injected. A slight conjunctival discharge ensued, and the "blister" produced by the injection was not entirely absorbed.

Histology: Fixation in 10 per cent. formal-saline. Celloidin sections. Hæmalum and eosin stain.

There was considerable effusion of blood into the neighbouring tissues, the effusion extending backwards to the posterior pole of the eyeball. There was no congestion of the choroid, and no exudate in the a.c. The vessels of the iris were dilated as compared with the control.

Experiment 3.—Albino rabbit. Ether anæsthesia. Killed 24 hours after operation. The dionin solution (employed in experiment 1) was used in this case, and 20 minims were injected.

Histology: Fixation was in Zenker's fluid. Celloidin sections. Hæmalum and eosin stain.

There was slight effusion in the neighbourhood of the hypodermic injection The choroid and sclerotic were unaffected. There was a slight dilatation of the vessels of the iris, otherwise there was no difference from the control.

Experiment 4.—Small grey-brown rabbit. Ether anæsthesia. Killed 48 hours after operation. The dionin solution was used, and 10 minims were injected. The "blister" had become entirely absorbed at time of death, a slight local congestion being all that remained to mark the operation.

Histology.—Fixation in 10 per cent. formalin solution Paraffin sections. Hæmalum and eosin stain.

There was little or no effusion of blood in the tissues. There was a slight conjunctival infiltration at the site of the operation. There was dilatation of the vessels of the iris, but otherwise the eye showed little or no change.

Experiment 5.—Grey rabbit. Ether anæsthesia. Killed 48 hours after operation. The solution employed was an 8 per cent. solution of NaCl, and 15 minims were injected. This had become almost completely absorbed at time of death.

The aqueous fluid in this case was tested for the presence of albumen. Immediately after death (by $CHCl_3$) the aqueous from both eyes was drawn off in a hypodermic syringe and placed in separate carefully labelled watch glasses. On testing by means of tri-chlor-acetic acid no increase of albumen was observed for the operative eye.

Histology.—Fixation in 10 per cent. formol-saline. Paraffin sections, Hæmalum and eosin stain.

There was practically no effusion of blood in the tissues. There was a slight increase in the number of cells in the subconjunctival tissue at the region of the operation. There was no congestion of the choroid, no infiltration of the sclerotic, and practically no change in the vessels of the iris.

Experiment 6.—White rabbit. Ether anæsthesia. Killed 67 hours after operation The solution used was the dionin solution, and 15 minims were injected. The animal became ill the second day after the operation, and was killed by $CHCl_3$. There was a slight corneal haze at the region adjoining the site of the operation, but the "blister" had become entirely absorbed. The aqueous fluid was tested by the tri-chlor-acetic method, and was found to contain a considerable increase of albumen as compared with the control.

Histology.—Fixation in 10 per cent. formalin. Paraffin sections. Hæmalum and eosin stain.

There was considerable inflammatory infiltration of the cornea at one side (corresponding to the opacity observed clinically). The sclera, choroid, and iris were practically unaffected.

Experiment 7.—Albino rabbit. Ether anæsthesia. Killed 72 hours after operation. Hypodermic injection consisted of 10 minims of the dionin solution.

Histology.—Fixation in picro-formol solution. Paraffin sections. Weigert's iron-hæmatoxylin stain.

Experiment 8.—Small brown and white rabbit. Ether anæsthesia. Killed 72 hours after operation.

Injection consisted of 20 minims of the dionin solution. This had not become completely absorbed. The animal became ill on the second day after operation, and was killed by $CHCl_3$.

Histology.—Fixation in picro-formol solution. Paraffin sections. Weigert's iron-hæmatoxylin stain.

There was some effusion of blood in the neighbourhood of the hypodermic injection. There was a considerable amount of subconjunctival infiltration. The sclera and choroid were unaffected, but the vessels of the iris were slightly dilated.

Experiment 9.—Small black rabbit. Ether anæsthesia. Killed eight days after operation. Injection consisted of 12 minims of dionin solution. Tri-chlor-acetic test showed no increase of albumen in the aqueous fluid.

Histology.—Fixation in 10 per cent. formalin. There was practically no trace of operative interference, except that the choroid was of a little larger calibre than the control. This was the first case in which the choroid could be said to be in any degree affected, and even then the change was so slight that it is probably not of pathological significance. The other tissues were normal.

Comments.

From the above descriptions it is seen that, in the rabbit, subconjunctival injections are accompanied with little reaction, either clinically or histologically. Beyond a transient local irritation, the tissues of the eyeball are singularly free from disturbance. One would be justified in considering the physiological effects of subconjunctival injection, at all events in the rabbit, as small. The rabbit is an animal which reacts very slightly to operative interference, so that an exaggerated effect is not to be expected. With due allowance for the shortcomings of the experimental material, some points deserve special notice in the results obtained.—The operation causes little or no inconvenience, once the effects of the general anæsthetic have passed off, notwithstanding the fact that the blister is not always absorbed within the first 48 hours. In all cases a local irritation follows the injection, the infiltration being usually confined to the extrinsic tissues of the eyeball. The most noteworthy point is the dilatation of the vessels of the iris, a feature which occurs in the early stages of almost every case.[1] The choroid is unaffected in the earlier stages, and the affection when it does occur (as in experiment 9 eight days after operation) is so slight as to be of doubtful significance. The sclerotic is usually free

(1) It is to be noted that attention has been drawn to the condition of the vessels of the *iris*. The ciliary body in the rabbit is practically identical with the iris.

from any infiltration. The other point which is of value is the distinct increase of albumen which was found in the aqueous fluid in experiment 6. The absence of this feature in the other cases where a test was made is of less significance. It is to be regretted that the aqueous was not tested in every case, as one might have obtained still further positive evidence of the presence of albumen. It has been advanced as an explanation of the value of subconjunctival injections that, owing to the increased albuminosity of the fluid in the aqueous chamber, there is mechanical blocking of the filtration spaces, so that the presence of additional albumen is of considerable importance.

FIVE MONTHS' OPHTHALMIC WORK AT LUXOR IN 1910.*

BY

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CHIEF OPHTHALMIC INSPECTOR IN EGYPT.

The present ophthalmic organization in Egypt consists of five hospitals: the two large travelling tent hospitals visit in turn the larger towns, while the permanent hospitals are established in buildings at the two most important towns of Upper and Lower Egypt respectively, and at another large town, Mansoura.

Besides the hospital work, a system of ophthalmic inspection of some of the preparatory and primary Government Schools has been established dealing with more than 4,000 pupils.

The professional staff consists of a chief inspector, two inspectors, ten ophthalmic surgeons, and a staff of about sixty persons.

In each travelling hospital there are 10 beds, at Assiout permanent hospital there are 28 beds, at Tanta 19 beds, at Mansoura 16 beds. The main work of the hospital, however, is done among the out-patients. No trichiasis cases are admitted to the wards, but these operations are performed in the operation theatre, and the patient goes home and returns on the fourth day to be dressed for the first time. The beds are reserved for cataract and glaucoma operation cases and for severe cases of conjunctival inflammation. Full clinical notes of all patients treated are made.

One of the travelling hospitals was working at Luxor for five months during the winter of 1909-10. As usual, many more patients presented themselves for treatment than could be dealt with. Actually 25 new patients were seen and treated daily, each of whom attended on an average 17 times; the average number of cases examined daily being 300.

The majority of the patients at Luxor came to be treated for diseases of the eyelids, but many other cases of interest were seen, including 279 patients with cataract of whom 71 underwent operation.

The number of blind patients examined at Luxor was very great. When the travelling hospital was opened it seemed as if all the hopeless cases of the neighbourhood came to ascertain if anything could be done for them, and the percentage of blindness in one or both eyes amounted to 19 per cent. Later when the hospital had been at work for a couple of months, the blindness fell to 13·5 per cent.

The statistics of blindness among over 100,000 hospital patients seen in four years show 8·9 per cent. of blindness in one or both eyes. The Egyptian

* Abstract of a paper read on July 28th, 1910, at the British Medical Association Annual Meeting.

census of 1907 gave 4·5 per cent. of blindness among the general population ; this is naturally considerably lower than statistics obtained from hospital patients.

Primary glaucoma, a condition in which the eyeball becomes abnormally hard and which usually results in blindness if not operated on, is extremely rife in the Luxor district, 299 cases were seen, or 5 per cent. of the cases examined ; of these 59 exhibited absolute glaucoma in one eye and 132 in both. In only six cases was the vision remaining sufficiently good to warrant the performance of iridectomy. Acute glaucoma in its initial stages is rarely seen in Egypt, since at the onset the patient, according to the usual custom, wraps his head up in a shawl and stays at home until he is blind, after which he is generally persuaded to seek surgical advice if it is available.

It is probable that many cases of early glaucoma were missed by the surgeon who examined the new cases, masked by conjunctival and corneal inflammations. Experience in Egypt does not appear to show that glaucoma has any particular relation with trichiasis, as has been suggested at various times in the East.

Incidentally, I may mention that 547 cases of in-growing eyelashes were seen, of which 226 had already been operated on unsuccessfully by unqualified practitioners. During the five month's stay at Luxor, 385 operations were performed for the relief of this condition.

The total number of operations performed was 1,855 during the five months' work, or fourteen every full working day. Of these, 1,182 were minor operations.

It is my business to inspect or to supervise the ophthalmic inspection of the preparatory schools at two of the largest towns in Egypt, containing 3590 pupils, and also to carry on a system of ophthalmic treatment at one of the primary schools in which there are 400 pupils. Trachoma is found in about 96 or 97 per cent. of the pupils. This proportion is about the same among the general population of the country.

A considerable improvement has been effected after three years' work at the primary school Tanta. This is shown by a diminution in the amount of the worst stage of trachoma from 43 per cent. to 2 per cent of the pupils. It is only by a division of the disease into four stages, as I have shown on various previous occasions, that any real enlightment of the observer can be attained.

Money and men are required before any complete scheme of ophthalmic relief can be realised in Egypt ; and these come slowly, although probably as quickly as we can expect. Mr. Graham, the Director General of the Public Health Department, has always shown himself desirous to extend the organisation for the relief of the enormous amount of suffering which now exists ; and we have the countenance of Sir Eldon Gorst in our work. At the present time we cannot expect much addition to our resources, owing to the financial needs of other departments, although the Financial Adviser to H.H. the Khedive, Mr. Paul Harvey, has on various occasions given us considerable and sympathetic assistance.

Of the origin of the scheme of Travelling Ophthalmic Hospitals by the generosity of Sir Ernest Cassel I have spoken in former communications.

Our scheme of ophthalmic relief means the provision of a permanent hospital in the capital town of each province and of a complete travelling hospital to tour the districts of each province. There should be, in addition, at least two flying columns consisting of two or three tents in charge of a single surgeon travelling in the more remote parts of each province.

Each of these elements would have a well-defined function. The flying column would treat only trachoma and conjunctival affections and their

sequelæ and should preach a propaganda of ophthalmic hygiene in the villages. More serious cases, requiring admission as in-patients, would be drafted to the complete travelling hospital or to the permanent hospital.

The permanent hospital of the province would act as a base for all the travelling hospitals of each province and as a centre of clinical instruction for post-graduate students.

I need hardly say that if one could look forward with any degree of certainty to compassing such ends, it would enable us to make light of many difficulties and fatigues to which in our somewhat wandering life we are liable.

[Various statistical tables, etc. of a technical nature are given, including the results of cataract extraction, the amount of monocular and binocular blindness at Luxor and in the rest of Egypt; an analysis of the causes of blindness seen at Luxor; and a description of a classification of the clinical course of trachoma into four stages.]

RECURRENT TUBERCULOUS CHOROIDITIS.

BY

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ALTHOUGH von Michel, of Germany, called attention to the fact years ago, that 40 to 50 per cent. of diseases of the uveal tract were tuberculous in origin, tuberculosis as a cause of chronic or isolated choroidal inflammation was thought to be extremely rare. But in 1901 Mr. Sydney Stephenson and Dr. George Carpenter, of London, pointed out that tubercle of the choroid may be found at any stage and in any kind of tuberculosis, and that cases may occur without generalized tuberculous infection.

In the following communication I wish to show that tubercle of the choroid is not only more common than we have thought, but that it occurs with a distinct clinical picture, and should be classified as one of the ophthalmoscopically recognizable forms of choroiditis.

Up to the present, the text-books describe two forms of tubercle of the choroid: the conglomerated, tumour-like, so-called "solitary" tubercle; and, secondly, miliary tubercles, occurring in the course of a general tuberculosis or tuberculous meningitis. To these a third class should be added, with the following clinical picture.—A young adult, from 20 to 34 years of age, seeks advice because of a slight disturbance of vision, usually seeing a dark spot in some direction before his eye. Examination discloses now, or a few days later, precipitates on Descemet's membrane, occasionally opacities of the vitreous, and a distinct swelling of the papilla, especially in one quadrant, as if a woolly mass partially covered it. In the choroid a few disc diameters from the nerve, at a spot not very far from the macula, a focus is seen, the appearance of which varies greatly, not only according to the stage when first seen, but also most probably according to the direction of its growth (whether toward the retina or toward the sclera). In a fresh case the focus most frequently has the appearance of an indistinct pearl-pink exudate, or a roundish bulging heap of asbestos-like "fuzz," varying from ¼ to disc size.

The changes taking place in these foci in the course of involution begin with a flattening of the focus, and the development of a well-defined yellow border-zone, faintly stippled with pigment. This pigment border becomes more and more prominent, the centre denser white and sparsely peppered with

pigment. At the end of two or three months the whole focus, which is larger than at first, may be considered quiescent, although it is usual for the pigment border to become still heavier as time goes on.

The three following are cases of this kind :—

Case I.—Mrs. B. Z. K., 28 years old, in perfect general health, complains of seeing a black speck before her right eye. Examination.—Veil opacities of the vitreous, and below in the periphery two atrophic choroidal patches, and less sharply defined than the other. Three years later, patient appeared with the complaint of renewed visual disturbances in the same eye, of four weeks' duration. Health good; family history good. Examination.—Many fine and some floating opacities of the vitreous, nerve œdematous, outline hazy. In the vertical meridian below, a few disc diameters from the nerve, a chain of four choroiditic foci, two new, two old, the oldest most peripheric. The most central is sharply defined, perfectly circular, non-vascular, and of clear pearl-gray colour. It is about one-third as large as the disc, raised above the choroidal surface, and is almost confluent with one of the two older foci. The other new focus lies between the two older patches, and has the appearance of œdematous retina overlying some indefinite exudate beneath One week later, the circular focus was flatter, and had developed the halo-like yellow border zone. After two months, the media were clear, the circular focus was larger, horizontally oval, sharply outlined but flat, and of a translucent grayish white. No well-defined pigment border present, but beginning pigmentation of the yellow border zone. The smaller new focus appears as a faint irregularly atrophied choroidal area.

Case II.—Mr. S. G., 23 years old, in excellent general health. One brother has tuberculosis. Complains of slightly blurred vision and seeing a spot before left eye for past four or five days only. Findings.—Precipitates on Descemet's membrane; optic nerve swelling of two diopters. Near a branch of the superior nasal artery, about five disc diameters from the nerve, a whitish elevated choroidal exudate is seen, surrounded by a few minute hæmorrhages and a little pigment. Three weeks later, disappearance of precipitates, eye without irritation. Nine weeks after the onset of the trouble, patient complained of renewed blurring of vision for five or six days. Veil-opacities of the vitreous blur the clear view of the now more swollen nerve, indicating the possible presence of a new focus which was not discovered with the ophthalmoscope. Old choroidal patch well-defined, pigment border beginning. In another month the choroidal patch was about cicatrized, nerve swelling considerably diminished. Patient not seen again until eight months later, when renewed visual disturbance was noticed. Findings.—Media clear, but near the nasal and lower edge of the old patch one new indefinitely outlined focus was seen in the choroid or beneath it; the area was elevated about 6 D., and coloured grayish-fawn. Another pearl-grey nodule lies below this, sharply defined, and a third indefinite minute focus above it. Marked papillitis. A tuberculine injection of $\frac{1}{2}$ milligramm for diagnosis was made. No reaction. One week later a second diagnostic injection, 1 milligramm. This time reaction was positive locally, as shown in renewed opacities of the vitreous and change in the colour of the patches. Eleven days after the second injection, the old patch had become œdematous, striated, bulging below, and there were many fresh opacities of the vitreous, diffuse and floating. Two weeks after this, the vitreous was clear, and the papillitis disappearing. The two small nodules were flat, spattered with pigment, but the whole area, which included the oldest atrophic patch, and the newer irregular ones, was still elevated, as though pushed forward by a mass in the underlying sclera.

Case III.—Mrs. E. L., 20 years old, two months pregnant, in good general health, and with a good family history, complained of seeing black spots before her right eye for two or three days. V O.D.=6/6. Findings.—An oval atrophic choroiditic patch above the macula along the course of the superior temporal vessels, with a fresh focus appearing at its outer-upper edge. In the course of the next ten days, the vision was reduced to 4/18, due to increasing dust-like opacities of the vitreous, mainly in the anterior parts. The new focus had grown, and had the appearance of a light-coloured indefinitely outlined choroidal exudate. After this, clearing of the vitreous with involution of the patch begun. Nine weeks after the onset of the trouble, vision was 6/5, and the vitreous entirely clear, although involution was not yet complete. After two years the following findings were noted.—Media clear. The first old oval patch has a voluminous wreath border, composed of stellate pigment masses. The smaller, newer, contiguous focal area is less distinct, less pigmented, and of tesselated appearance. The retinal vessels in this region run over the pigment border.

Remarks.—These three cases all occurred in young healthy adults, in whom no other tuberculous lesions could be traced. They showed, in common, recurrence, the development of precipitates and vitreous opacities early, an intense papillitis, a comparatively central location of foci, of circular or oval shape, and an increased size and pigmentation of the old quiescent patches. They exemplify a type of chronic recurring inflammatory process in the choroid, the true nature of which has not been generally recognised, and which consequently has not been properly classified among the tuberculous choroidal affections. Although positive proof of their tuberculous nature is not possible, we may take as corroborative evidence the following points.—*First*, the great prevalence of the tuberculous compared to other pathological processes, especially in early life. *Second*, the recognition of gray miliary tubercles, as such, ophthalmoscopically in some fresh cases, and the identity of the picture in others with that seen in acute miliary tuberculosis or tuberculous meningitis. In the obsolete cases, their distribution in the fundus of one eye, not widely disseminated, but occurring singly or as a confluent group in different stages, and their more or less central location, are details characteristic of tuberculous rather than luetic lesions, with which they have, until now, been commonly classed. *Third*, Sydney Stephenson proved the tuberculous nature of the lesion in one case by finding tubercle bacilli in the aqueous. *Fourth*, a positive local reaction in the affected organ after a diagnostic tuberculine injection in one of my cases: and *Fifth*, the tendency, not only to recurrence, but to recurrence in the neighbourhood of old cicatrised foci, which is a characteristic of the chronic tuberculous process everywhere. All of these factors justify us in classifying as tuberculous this far from rare form of recurring choroiditis, easily recognisable with the ophthalmoscope.

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RETINITIS PIGMENTOSA.*

BY

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THE title of this disease, "retinitis pigmentosa," is, in the opinion of several writers, technically incorrect, but opinions vary so widely with regard to the disease that it would be impossible to find a title that would satisfy the views of all observers. For my own part, I rather like the name, "retinitis pigmentosa." I think it is probably more nearly correct than is considered to be the case by critics. In order to find a common basis with other observers, I have consulted various treatises on eye disease; but there is so wide a divergence of opinion on many fundamental points that I think it better to disregard the classifications that have been made and to treat the subject *de novo*.

I think this disease perhaps more than most others has suffered at the hands of those who compile treatises on the eye. I use the word "compile" advisedly, because in retinitis pigmentosa the observations of other surgeons are largely relied upon and quoted by those who have written the class of book to which I allude. I was particularly disappointed with one of the most recent works on the subject, that of Dr. William T. Shoemaker,† wherein one would expect to find reference to all the symptoms which may be present in this disease; but there appears to be hardly anything fresh in the observations which he himself has made or which he quotes from other writers.

For my own part, I have for a long time felt considerable surprise that further details have not been described, for there are several points which are

*A lecture delivered in the course of Ophthalmology in the University of Oxford on July 18th, 1910.

†*Retinitis Pigmentosa, with an analysis of seventeen cases occurring in Deaf Mutes.* Philadelphia, 1909.

found fairly constantly to which I have been able to find no allusion. The difficulty in diagnosing this disease arises, I think, from the fact that there are conditions to which it is closely allied. I allude to cases of choroiditis with subsequent affection of the retina leading to atrophy and pigmentation, in which symptoms of night-blindness are frequently found. In describing this retinitis pigmentosa disease it has seemed to me, from the observations I have made, that writers describe the symptoms of different periods of the disease as being peculiar to different forms of the trouble instead of to variations in what may occur in the same case, earlier manifestations showing one class of symptoms, later manifestations showing perhaps the opposite, particularly with regard to night-blindness and to day-blindness.

Now, turning to the characteristics of the disease itself, I may best describe it by pointing out, in the first place, what are the early symptoms that draw the attention of the patient to his trouble. Inability to see in the dusk and the fact of stumbling over objects in a poorly-lighted room generally first bring the patient under the observation of an ophthalmic surgeon. The other symptoms that may then be discovered are torpor of the retina, or slow sight, by which I mean that images take some time to impress themselves upon the retina. There is sometimes another remarkable symptom, namely, that the images are very slow to fade, and when the patient's attention is turned to another object, he may still see the late image superimposed upon the more recent image for a few moments. In addition to the above symptom of not seeing in the dusk, called "night-blindness," there may be dazzling in bright light. Patients in the earlier stages, however, prefer the condition of good diffused light and will always choose to read by daylight, but in the late stage of the trouble sometimes a remarkable change takes place and the patient will cease to be able without great difficulty to read by daylight, but will prefer a certain artificial illumination. I say "a certain illumination" because it is a very exact degree that is chosen. The patient will establish himself by a known light at a fixed distance from that light, and any variation from that fixed illumination and fixed distance confuses him very much. This is one of the things to which I was alluding when I said that different symptoms occur in the same patient in different stages of the disease. I have known one case in which bright moonlight was as useful to the patient as daylight. Another point often noticed is a momentary sense of bright light circling round the periphery of the field. This is not uncommon, although I have not seen it mentioned by any writer on the subject. As the disease progresses, the night-blindness increases, so that patients are practically blind when the illumination is reduced below a certain point. If they should live in the country, where there is no gas or electric lighting in the roads, they are absolutely powerless to know where they are going and will walk into the ditch as readily as along the road. Eventually, the fields of vision become so narrowed that the patient has practically only a small patch of vision before him which he has to bring to bear on any objects that he wishes to see. Very often, however, quite late in the trouble, a zone of vision at the extreme periphery is preserved, a condition known as "ring scotoma." Ring scotoma is a very constant symptom of this disease in the earlier stages. I do not know whether it always occurs, but I suggest that it would probably be found, at least in the earlier stages, if looked for. Central vision generally is preserved intact to a late stage of the disease, but there are a few cases in which it is affected quite early, sometimes producing nystagmus, or, again, it may come on at a somewhat later stage of the disease. Such affection is not extremely uncommon, since I can recall at this moment five such cases. Of course, it leads to very great disturbance of visual

acuity. Again, some cases hardly advance beyond night-blindness, the field remaining fairly good. That such symptoms may occur in true retinitis pigmentosa is shown in a personal case where there was night-blindness with just a trace in one spot of retinal pigmentation, but nothing more, although the patient lived to a good old age. Her two daughters, however, were affected with true retinitis pigmentosa. Although Shoemaker throws doubt upon the existence of such cases, I have had one case, absolutely typical in every way, in which only one eye was affected. Further objective symptoms can be discovered on examination. Generally, a pigmentation of the retina, of lace-like pattern, will be found towards the periphery, but not usually at the extreme periphery, where there is an area of apparently normal retina. The pigmented zone surrounds at a distance the macular region and as the disease progresses, approaches nearer and nearer to the latter.

This pigmentation varies greatly in degree. But there is another important condition to which I wish especially to draw attention and to which I have seen no allusion in any of the books consulted by me, namely, that just inside the pigmented zone may be seen distinctly in many cases another zone of greyish infiltration, rather the colour of powdered slate pencil, perhaps a little paler. This can be seen in the retina and is more especially associated with the vessels, and, where the pigmented zone joins this zone, some of this exudation, if I may so call it, is seen to be in the process of pigmentation, some pigmented and some not. I think it very remarkable that this condition has not been noted before, because in some cases it is quite conspicuous, although in others it is hardly observable. The optic disc is changed and has a waxy appearance, and the physiological cup is filled in. The vessels are all relatively narrowed, but on these two points I shall lay particular stress presently.

Now, there is another condition about which I again express surprise that no observations have been made with regard to it. True, opacities in the vitreous have been described, but the opacities of which I am about to speak are of a very peculiar character. They are nearly always very difficult to see. In the first case in which I noticed them there was, just in front of the retina, a regular laying of interlacing, fine, opalescent threads covering nearly all the retina and resembling very much the gossamer seen on an autumn morning over a turnip field, and, although it was difficult to see, once it was focussed, it presented this very remarkable appearance, although I have never noticed this in so marked a degree except in the above patient and her sister, yet in nearly every case of retinitis pigmentosa, if carefully looked for, opalescent opacities may be found in the vitreous, more especially at its posterior part. Sometimes the material appears in masses, literally in "chunks," but more often it requires a careful search to discover it. I was very much struck by an observation of Schobel accompanied by a picture in Norris and Oliver's *System* describing and illustrating a visible canal of Cloquet in the vitreous filled with opalescent material, and he mentions that in the five cases in which he had seen this appearance three of them occurred in retinitis pigmentosa. I think it is highly probable that this visible canal of Cloquet was full of the very material of which I am speaking as occurring in retinitis pigmentosa.

To return to the condition of the retina, sometimes the vessels, more especially the veins, become ensheathed in the pigmented area. Sometimes from loss of all pigment in the epithelial layer of the retina and destruction of the chorio-capillaris, choroidal vessels show up and the interspace between the large vessels may be heavily pigmented, proving that the choroid has shared in the destructive process. Some authorities (I think probably most)

consider that the disease begins in the choroid and extends to the retina. I am not at all disposed to accept this view, however, for I have seen cases in which there was no manifest affection of the choroid.

In addition to these changes, there may be a peculiar change in the capsule at the posterior pole of the lens, and later on, a true cataractous change in the posterior part of the lens itself, and, again later, complete cataract may form. I draw your attention to another remarkable symptom after extraction of the lens in keeping with what I have mentioned before, and this is a recurring film in the pupil exactly like a wrinkled capsule that requires needling. The first case in which I noticed this was one in which the lens had been removed by another surgeon. I was not in communication with him (he was a foreigner), but the patient assured me that sometime after the operation the capsule had been needled. I expressed grave doubt about that, because the appearance of the condition was exactly like that of opaque capsule. He told me that his vision had of late gone down very much, and when I saw him, with correction it was less than $\frac{6}{36}$. He informed me that his vision had rapidly got worse in the last three weeks, and I noted—"The right pupil is full of opaque capsule." I needled the eye and his vision went up to $\frac{6}{12}$, and I was able to observe that he had a *drusen* body overlapping the inner side of the right disc. I was quite satisfied myself that the case was one merely of opaque capsule. I saw him seven months later with the history that the sight had again failed during the last three months, and his vision was again less than $\frac{6}{36}$. After examination, I made the note—"It looks now exactly as if it had never been needled." I again needled the eye, and the vision again went up to $\frac{6}{12}$. The next year I saw him again, and made the note—"The so-called capsule seems to be forming again, and the vision has only fallen to $\frac{6}{18}$." I had exactly the same appearance in another case in which I removed the lens, and each eye had to be re-needled in the course of five years, the right eye three times and the other twice.

So much with regard to the exudation which seems to occur in the retina and the vitreous in connection with retinitis pigmentosa. I will allude to it again later. Now, in rare cases one may find all these symptoms present without any pigmentation of the retina. With this one exception, the symptoms are identical. I have, however, noticed in two cases that the vessels were not so much contracted as is usually seen in the pigmented cases. Whether this was merely a coincidence, or has some special relationship to the non-pigmentation further observations will doubtless show. I lay no particular stress upon the observation, but merely mention it. In one of these non-pigmented cases central vision was somewhat affected.

With regard to the field of vision which shows, as I have before said, progressive contraction, and often a ring scotoma, the rate of loss becomes relatively very much less the smaller the field becomes, although the main part of the field may have been lost fairly rapidly, the remaining small central patch may persist almost unaltered for years, though it is not absolutely stationary, and it is only quite late in life that patients become absolutely blind. In this central area, in addition to normal visual acuity, colour vision is generally quite good and also is larger relatively to the white field than in normal eyes, a point the explanation of which devolves upon those who talk about atrophy of the retina. I remember one patient who actually had only a small paracentral dot of light perception and in that dot he could recognise red colour.

Other conditions that are noticed in connection with retinitis pigmentosa are deaf-mutism or deafness (usually progressive), mental deficiency in varying degrees has been noted and so have malformations, such as polydactylism.

But what I want particularly to draw attention to, because I have not seen it noticed before, is the peculiar appearance of the skin. Sometimes the skin looks particularly gross, while in others it presents exactly the opposite condition which I may describe as very smooth and delicate with a kind of smoky lustreless appearance. I have seen this very marked in two cases and it presents a very striking appearance. You will notice that the epiblastic tissues are principally concerned in these accompanying troubles.

In this disease heredity plays a very important part and consanguineous marriage has frequently been noted. What share, if any, consanguinity has in the production of the trouble is a matter for a good deal of consideration at the present time. It must be remembered that this disease can in a great number of cases be recognised as having occurred previously in the family. If, then, two members of the same family intermarry, on the score of heredity and quite apart from consanguinity, one may expect that the chances of the offspring being affected are very much greater because there would be a tendency in both the parents. I have not had time to work out my cases, but in the majority (speaking from memory) there was consanguineous marriage. I hope at a later time to go into this in further detail. I will satisfy myself now with mentioning the facts, and pointing out the difficulty in determining what influence consanguinity has in producing the trouble.

Now, as regards the **pathology** of this disease, I have no personal experience, but reading up the observations of others, I have been struck by the almost universal admission that there is thickening of the retina, and, while there is atrophy of the retinal tissue, there is also a new development of fibrous tissue. Surely, this in itself would be definite proof that the condition is not simple atrophy, and there are other symptoms which support the same contention. The good central vision often being quite normal, and the relative excellence of colour vision, the appearance of the disc, the yellow, waxy look with the filled-in cup, all seem to me to point the same way, *viz.*, that the condition cannot be a simple atrophy. Then, again, the greyish infiltration of the retina inside the pigmented area, the gossamer opalescent threads at the back of the vitreous just in front of the retina, the almost transparent opacities, sometimes in "chunks," and, as I suspect in Schobel's case, filling up the canal of Cloquet, also the scum forming a condition like capsule after extraction of the lens all tend to show that we have some new tissue or exudation to deal with which infiltrates the retina, fills up the physiological cup, and gives a waxy appearance to the disc, producing perhaps *drusen* bodies, and the excessive fibrous tissue that is found in the degenerated retina. As regards the narrowed vessels, the simple atrophy of the retina or nerve would not reduce the size of the vessels, and in the simple atrophy accompanying tabes we notice that it does not do so; moreover, the colour of the disc does not suggest atrophy, nor does the excellent central vision nor the preservation of colour sense. It seems to me that the whole condition may be due to exudation I spoke of choking the vessels in the disc and diminishing their size, producing the peculiar colour of the disc, also perhaps the *drusen* bodies and the greyish appearance noticed in the retina. Its elimination by means of the lymph channels accompanying the vessels at the equator of the eyeball and those in the disc may account for the disc appearance and also for the pigmentation occuring first, as it does, in the neighbourhood of the venæ vorticosæ. I suggest that the elimination of this material chokes the lymph channels of the disc and those accompanying the venæ vorticosæ, producing, on the one hand, narrowed vessels by a process of choking, and, on the other hand, the blocking of the lymph space with subsequent pigmentation beginning in the region when the venæ vorticosæ perforate the sclerotic. This seems to my mind clear, but I can go

no further. I do not know what the substance is, where it comes from originally, or what gives rise to its production. I know that there is some power of secretion in the retina or the choroid, because the visual purple is developed, and where there is secretion one knows that abnormal conditions may arise in connection with it, but I cannot go further than this. I feel convinced that the condition is not an atrophy, for there is very little to support such a view and a great deal to suggest that it cannot be so. I am inclined to think that the trouble is originally retinal. There is no doubt that it does extend to the choroid and it is conceivable that it may originate there, or, on the other hand, it might be quite as plausibly argued that it originated in the vitreous. Again, as supporting this view, one may draw attention to syphilitic retinitis where undoubtedly there is exudation in the form of a thin semi-transparent veil in front of the retina, and always with great exudation into the vitreous in the form of dust-like and other opacities. This has to be got rid of by the lymph channels, and in this disease we find the same condition of night-blindness, the same narrowing of vessels, the same subsequent atrophy of the retina with later pigmentation, and the same ring scotoma, suggesting, again, that it is from the choking of the lymph space in the getting rid of the exudation that the interference of function arises.

The **diagnosis** of the disease from conditions that are not truly of the same nature is chiefly limited to choroiditis with subsequent affection and pigmentation of the retina, which is a more finite disease and does not progress after the condition has quieted down, and from the condition I have just mentioned, syphilitic retinitis, which is often followed, after the acute symptoms have passed off, by pigmentation of the atrophic retina.

As to **treatment**, it has been pointed out by many that nothing seems to check the progress of the disease except attention to the general health. Some years ago I showed that these cases were benefited by a diet of raw retinæ of sheep and oxen, and I made some very careful observations which have satisfied me that it is of use in this condition. I think probably the benefit arises merely from it as an article of food and not from specific action. The retina is starved of blood, which brings the pabulum to the tissues, and the way this food acts is probably by surcharging the diminished supply of blood with the exact constituents that the retina needs.

But in the matter of treatment one of the most remarkable effects is removal of the lens, even when the posterior capsule is only affected and that to no very great degree. I have noticed the statement in one text-book that the prospect of sight after removal of the lens was very poor, on account of the nature of the disease. Now, this happens to be directly opposed to the facts. The improvement that occurs on removal of the lens, even when so little affected that the normal-sighted observer can see every detail of the fundus without difficulty, is nothing short of marvellous. I have performed the operation several times, and with one exception, in which central vision was grossly affected, on each occasion I have been struck with the improvement, which was out of all proportion to what might be expected. I remember one patient especially whose vision was so reduced that she was unable to go about and barely able to read, except very big print under most strained and difficult conditions. Before operating, I sent her for the opinion of an experienced surgeon, who wrote to say that he was unable to recommend the operation. The patient, however, consented to have it done, and I afterwards sent her back to this surgeon, who expressed his great surprise at the result that had been achieved. Although it is some years ago, this patient can still read with comparative ease. Perhaps the most striking case of all from which I removed the lens

was that of an officer in the Army, whose sight was so bad that he was unable to go about alone and practically could not read. After operation, he could travel about by himself, and read anything; in fact, was hardly under any disability whatever. Yet, in both these cases, there was merely a little degeneration of the posterior capsule of the lens, and the details of the fundus could be seen without the smallest difficulty. I suppose the explanation of this is that the interference of light caused by the opacity at the posterior pole was not sufficient to make any practical difference to the normal-sighted on looking into the eye, but sufficient to reduce it in the case of the patient to a degree that was insufficient to stimulate the retina. I can only say that my experience is so positive in these cases, for which *noli me tangere* used to be considered an appropriate maxim, that I urge you most strongly, if you have a similar case with opacity of the posterior capsule that makes any marked difference in the illumination within the eye, not to hesitate to remove the lens. In connection with removing the lens, there is one point which I noticed in every case that I have done, and which I think, therefore, must be more than a coincidence, and that is that I have had considerable difficulty in getting the lens away after opening the capsule. The lens seems to adhere to the capsule.

Summary.—In sum, then, amongst undescribed symptoms and appearances of retinitis pigmentosa we find.—1. Persistence of images; 2. in advanced cases a marked preference of the patient for a particular degree of artificial lighting; 3. a momentary sensation of bright light circling around the periphery of the visual field; 4. a zone of greyish infiltration situated just inside the main pigmented zone characteristic of the disease; 5. a layer of fine opalescent vitreous opacities lying immediately anterior to the retina.

As to treatment, benefit may be derived from retinal feeding, and considerable improvement in sight not infrequently results from removal of the cystalline lens.

THE BACTERIOLOGY OF ULCERATION OF THE CORNEA.*

BY

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THE application of bacteriology to diseases of the cornea, from the practitioners' point of view, is almost entirely limited to those destructive processes which result in the formation of infiltrates and ulcers.

The account, given in pathological text-books, of the changes occurring in any structure as the result of inflammation, can be applied at once to the cornea, being generally a description of what has been observed when irritants were introduced into it. You will, therefore, be well aware of the cellular infiltration and liquefaction of tissue, which finally results in the formation of an ulcer.

The pathological processes involved in the formation of these lesions will be well known to you, and clearly the hypothesis that their origin is bacterial is quite a natural one.

I will accordingly confine my remarks to the principal facts which have been established regarding the influence of different bacteria on their origin, their course, and their treatment.

* A lecture delivered in the Course of Ophthalmology in the University of Oxford on July 16th, 1910.

With a view to the assistance of those who may feel disposed to undertake bacteriological investigation, I shall endeavour to keep the practical side of the subject most prominent, and propose to deal with :—

(1) The collection and investigation of material.

(2) The varieties of ulcers, classified according to the organisms present.

(3) The influence of these findings on prognosis and treatment.

It is very important, in dealing with the cornea, not only to obtain material for investigation from the actual focus of the inflammatory reaction, but to do so without causing any dissemination of that focus into the sounder tissues around. The greatest care must be taken in scraping an infiltrate, and proper preventive treatment should be applied to the spot immediately thereafter. In many cases of central ulceration, when perforation appears imminent, no thorough investigation on these lines is justifiable, and the diagnosis must then be made from clinical appearances. Our hopes are that in time the clinical aspects of each form of corneal ulcer may be so definitely recorded, and our methods of investigation become so exact that this somewhat barbarous removal of tissue may be unnecessary ; but until that time comes we must continue with the stained slide and the culture tube.

The most important material is the *débris* from the infiltrate or ulcer, especially that taken from the site of densest infiltration, where presumably the causal organisms are most numerous and of strongest growth. To obtain this, the eye must be cocainized and fixed, the lids being held away by a speculum. The conjunctival sac and the surface of the ulcer should be flushed with normal saline or some neutral fluid, to remove material tainted by the lids Then, with a small platinum spud, the densest parts of the lesion should be scraped, and the material thus obtained inoculated on a tube, and some rubbed out on a clean slide. It is necessary to have some knowledge of the mode of spread of ulceration to remove the best material with the least possible damage, and some of the points worthy of consideration will be mentioned when considering ulcers in detail. Material of less value, but still of considerable utility, is supplied by conjunctival discharges and fluids expressed from the lacrymal sac. Such will be readily collected by a simple platinum loop.

Having obtained our material, which obviously will often be scanty, a successful investigation will depend on its very careful disposition. The number of tests possible is small. They must therefore be thorough.

In the first place, we must consider the media used for cultivation. It is necessary that a single tube, or at most two different tubes, should be capable of growing any organism which occurs, as, of course, when cultures have failed, no further supply of material is available. Loeffler's blood-serum is a good medium for general use ; it should be fractionally sterilized at 60° C., and should be only very faintly alkaline. The ordinary cooked blood-serum used for diphtheria work cannot be recommended, as on it pneumococcus often fails and the Morax-Axenfeld bacillus rapidly dies out. Wertheim's serum-agar is perhaps even better, especially for refractory bacteria. It is made by mixing neutral 1 per cent. agar with ¼ its bulk of human serum, the best being made with ovarian cyst-fluid, and on it even the gonococcus and the Koch-Weeks' bacillus will grow well.

The staining of the smears is very simple, as there is one method which far excels all others—the Gram stain. In the majority of cases a simple Gram slide will settle the diagnosis at once.

While there are many modifications of Gram's original method, that of Jadassohn is simple and reliable :

The film is fixed in a flame and stained for about 30 seconds in the following : 88 pts. 5 per cent. aqueous gentian violet, 10 pts. abs. alcohol,

2 pts. aniline oil. Wash with water, fix the stain with Gram's iodine solution, decolorize in alcohol, wash in water, and counterstain.

The feature of this method is that the alcohol washes the gentian stain (violet) out of some species of organisms, which then take the counterstain (neutral red). But the action of the iodine prevents this from occurring in other species, which therefore remain violet.

Bearing in mind one or two of the important biological characteristics of the organisms which experience has shown are to be found in the cornea, the diagnosis of our material becomes easy.

Using as differentiating criteria the form of the organism—coccus or bacillus—and the Gram reaction, positive or negative, we obtain four classes :

A. Gram-*negative* bacilli.
B. Gram-*positive* bacilli.
C. Gram-*negative* cocci.
D. Gram-*positive* cocci.

A. The Gram-negative bacilli are again sub-divided by culture reactions into :—

1. Those not liquifying blood serum—
   - Bac. Koch-Weeks.
   - B. Influenzæ.
   - B. Friedländer.
   - B. zur Nedden.
   - B. Coli Communis.
2. Those liquifying blood serum (important in ulcers)—
   - (*a*) Not fluorescent (large) — B. Morax-Axenfeld; B. Petit.
   - (*b*) Fluorescent (small) — B. Pyocyaneus.

B. Gram-positive bacilli (unimportant)—
   - B. Xerosis.
   - B. Subtilis.

C. Cocci. Gram-negative—
   - The gonococcus.
   - Micrococcus catarrhalis.
   - Meningococcus.

D. Cocci. Gram-positive—
   - Pneumococcus.
   - Streptococcus.
   - Staphylococcus.

With the aid of this classification, and the knowledge that all the organisms that are of interest to us are to be found in this table, it will be clear that the amount of bacteriological knowledge necessary is not great, but I might point out that, although limited in extent, it concerns some rather unusual organisms. We need know little about such organisms as the tubercle, anthrax, or tetanus bacilli, but we should be quite familiar with the Koch-Weeks', the Morax-Axenfeld, and the xerosis bacilli, organisms which may be merely names even to quite expert bacteriologists.

Very early in the bacteriological investigation of corneal ulceration attention was directed to that condition known as *ulcus corneæ serpens*, and the group of densely infiltrated ulcers usually accompanied by hypopyon.

The clinical features presented by cases of purulent keratitis vary considerably, but when large numbers are examined, a fair proportion of them will be found to have certain common characteristics, and this led Saemisch in 1870 to describe, as a clinical entity, a form of ulceration which he named "*Das ulcus Serpens*," the serpiginous ulcer.

The investigation of these cases was never satisfactory until Uhthoff and Axenfeld found that from a large proportion of them the *Pneumococcus* could be obtained, often in pure culture. Subsequent investigations have confirmed their findings, and we can now take it as an accepted fact that the pneumococcus, when introduced into the cornea through a breach in its epithelium, can cause a purulent ulceration.

But all purulent ulcers are not due to the pneumococcus; we find the streptococcus, the B. pyocyaneus, the B. pneumoniæ, the B. coli, the staphylococcus, as well as the Morax-Axenfeld bacillus, and the bacillus of Petit. The prognosis and the treatment vary with the different organisms; and considering the modern trend of treatment towards the use of vaccines and sera, the importance of an exact bacteriological diagnosis is obvious.

Ulceration of the cornea, due to pneumococcal infection, has been studied in its bacteriological aspects more exactly than any other form, and it will simplify matters if we consider it rather fully.

The reaction of the individual man to individual strains of pneumococci varies within very wide limits. The bacterial virulence and the human resistance are both variable, and the clinical features of the lesion produced cannot, therefore, be the same in all cases. There is, however, a type of ulceration to which all pneumococcal infections of the cornea tend to conform, and to which they actually do conform to a striking degree when we have to deal with a patient of average resistance and an organism of average virulence.

After a slight injury to the cornea, we find the patient complaining of some obscurity of vision and redness of the eye; a small white spot is noticed in the cornea; and in a few days intense pain may supervene. If the case be seen in the early stages, a small defect is found on the surface, where the epithelium is raised over a dense, white, round, sharply-defined infiltrate.

Generally, an ulcer is fully developed when the case is first seen. Then we have a circular shallow surface defect; one part of its circumference is very distinct, forming a prominent lip, underneath which is a dense yellowish-white infiltration: the opposite edge is faint, without an obvious breach in the epithelium, and quite difficult to see unless by a study of the surface-reflex. These two parts of the ulcer are termed respectively the "advancing" and the "healing" edge; the former is overhung, is the seat of active progress, and the situation in which the rapidly growing pneumococci are found in greatest number and most typical form. The floor of the ulcer is not the advance post of the disease; the spread is superficial, hence the name "serpiginous."

In obtaining material, it is necessary to collect from under this overhanging and advancing edge, where the organisms are rapidly growing; and to avoid the floor, where none but old, dead, or involuted forms are met with, along with many saprophytes.

The ulcer is generally associated with hypopyon, and this often spreads up on the back of the cornea, when the ulcer appears to have burst through the cornea and to be pouring pus down into the anterior chamber. Such, however, is not really the case. The so-called pus in the anterior chamber is a collection of phagocytes which have been attracted to the site of the lesion by positive chemiotaxis, and are climbing up the back of the cornea in their endeavour to meet the invading pneumococcus.

The exact site of the cocci and the arrangement of the advancing edge is very clearly seen in a section of the ulcer. They lie in the densely infiltrated lamellæ under the lip of the advancing edge, and extend a short distance beyond the actual breach of surface. They form small clusters, which are readily seen in a Gram-stained section.

The infiltrated edge is therefore clearly the site of the pathogenic process, and the point to which all remedial measures should be applied; it is obvious that the floor of the ulcer can be neglected, and, indeed, the application of the cautery to the floor often results in unnecessary destruction of tissue in the typical cases which we are now considering.

In the early stages the pneumococci are found in the infiltrate, and the lateral spread has been explained by the arrangement of the lymph spaces between the lamellæ preventing the spread in depth, but allowing marginal extension. It appears paradoxical that spread occurs where the cellular infiltration is densest, and where we would expect to find the greatest resistance. Römer's explanation of this relies on the double reaction of a tissue to organismal invasion—namely, histolysis and bacteriolysis.

The leucocytes form a histolytic ferment, which liquifies the tissues invaded. A specific amboceptor is also formed, which allows the complemental substance in the blood to attach itself to the organism present, and thus render it vulnerable to the attack of the leucocytes. This destruction of bacteria, or bacteriolysis, can occur only when the tissues freely supply the necessary protective bodies. When the infection is a small avascular focus in the cornea, the development of anti-bodies is slight. The result is that the leucocytes cannot rapidly destroy the organisms, although the ferment being formed, the solution of tissue goes on, and spread thus occurs where the cellular infiltration is densest.

The rationale of serum treatment therefore is :—

(a) To supply bacteriacidal substances to the organisms.

(b) To supply the necessary anti-bodies.

Römer's serum treatment was devised to fulfil these requirements. By active immunization he raised the anti-microbic power of the blood; while, at the same time, he applied immune serum to the ulcer. Unfortunately, the results of this treatment, on the whole, have not been any better than those obtained by the cautery.

The agglutination test shows that the pneumococcus of the corneal ulcer is identical with that obtained from the lung in cases of pneumonia. When obtained from the advancing edge, we have the typical lancet-shaped encapsulated pairs of Gram-positive cocci.

The sources of infection are :—

(1) The source of injury may be infected—a foreign body from the street, or a dirty implement, may wound the epithelium and implant the pneumococcus. This, however, is uncommon.

(2) The sputum or nasal discharge of the patient, or some other individual, may come in contact with an abrasion. This is quite commonly seen when a workman has tried to remove a foreign body from his mate's eye by means of a dirty handkerchief, the end of which he has first moistened with saliva.

(3) The pneumococcus may be present in the lacrymal passages, and, therefore, the conjunctiva be infected before the injury occurs. This is probably the most common source. The pneumococcus is more frequently found than any other organism in a mucocele; but so long as the epithelium is intact, the cornea is safe. The smallest wound, however, will admit the bacteria and cause the ulcer.

In every such case of a mucocele, the ulcer must be judged on its clinical appearances, as mucoceles do occur without pneumococci in the sac, and then the ulcer may or may not be a pneumococcal one.

From the situation of the pneumococci it is clear that any caustic antiseptic must be applied at the advancing edge and under the overhanging lip. When

the actual cautery is used, the area destroyed must extend a little beyond the broken edge of the epithelium : it is unnecessary, and may be actually harmful, to cauterize the floor of the ulcer.

Re-infection from an infected lacrymal sac is very likely to occur in those cases due originally to infection from this source. Once an ulcer has formed, no temporising with a mucocele can be admitted. Excise the sac at once, and paint the lids with strong protargol solution, in the hope of destroying the organisms in the conjunctiva, and removing their source in the sac.

Some cases of corneal ulceration due to the pneumococcus do not resemble the clinical picture we have considered. There are quite a number of ulcers which appear to show essentially a different character and mode of spread, and in which we find other well-known organisms.

The available information about these ulcers is scanty, but regarding purulent keratitis due to the streptococcus, B. pyocyaneus, and the pneumobacillus, enough is known to allow us to put forward certain generalizations without much reserve. The *streptococcus pyogenes* has been cultivated from the *débris* of corneal ulcers, whose clinical history has been carefully observed and in which the cornea has been available later for pathological examination. These ulcers do not form in cases of streptococcal conjunctivitis, nor in acute streptococcal dacryocystitis, but appear to occur, as does the pneumococcal ulcer, essentially as a corneal lesion. The ulcer is round, and the margin is irregular and swollen, showing a ragged edge. The base is densely opaque, yellowish-white, and covered with necrotic *débris* ; most of the cases recorded had already perforated. The rest of the cornea is clouded. A well-marked infiltration zone surrounds the ulcer.

The interesting point brought out by the examination of sections of these ulcers was that the streptococci were distributed irregularly in the necrotic *débris* covering the floor, and in the infiltrated tissues below it. There was no tendency to their limitation to the margin.

The available information is derived from severe cases in a rather advanced stage, where, necessarily, treatment was not very efficacious. It appears that the necrotic floor must be freely scraped and then disinfected with some penetrating caustic, such as pure carbolic acid, if we are to reach the actual organisms by our antiseptics.

The organism present is the common streptococcus pyogenes. Its diagnosis is not always easy, as in rubbing the material out on the slide, the chains may be broken up. In case of any doubt, a bouillon culture will always show good chains, and furnish a differentiation from the staphylococcus.

The streptococcus is a Gram-positive coccus, resembling the pneumococcus in growth, but differing in form.

Ulceration due to the *bacillus pyocyaneus* is rare. The recorded cases have been very severe with destruction of almost the whole cornea. One case which I had the opportunity of examining was of the most serious type ; the corneal lamellæ disintegrating and resembling nothing so much as wet blotting paper, the whole being covered with thick greenish-yellow pus. The appearance might reasonably suggest the particular organism present, although its rarity almost puts it outside the range of practice.

If some of the discharge be inoculated on a tube, growth is very rapid, and in a few hours the characteristic greenish fluorescence indicates the presence of this organism.

The *bacillus pyocyaneus* shows a preponderance of bacillary forms varying extremely in length. Grown on neutral agar, it produces two pigments, one of which is fluorescent and insoluble in chloroform, the other, pyocyanin, is sky blue, and can be extracted by chloroform ; the agar is broken up and shaken with the chloroform becomes blue.

Bacillus pyocyaneus is a Gram negative bacillus, which rapidly liquifies blood-serum. This organism seems to have the power of rapid diffusion into the interior of the eye, even causing abcess-formation in the vitreous. With regard to treatment, the strong probability of a panophthalmitis calls for the operation of corneal section as soon as possible.

Ulceration due to *Friedländer's pneumobacillus* has been studied by Gourfein especially, and while further records are desirable, these ulcers appear to be characterised by the gelatinous appearance of the *débris* on their floor and their regular spread, so that a round, rather funnel-shaped, depression is produced.

The amount of hypopyon is very great, and the accompanying iritis is of the plastic type, although the pupil can generally be more widely dilated with atropine than in the case of the pneumococcal ulcers.

Ordinary antiseptic treatment usually gives a satisfactory result.

The pneumobacillus is Gram-negative and grows on solidified serum without producing liquefaction. The culture has the same gelatinous appearance as the *débris* of the ulcer.

Diplobacillary Ulceration.

The diplobacillus of Morax and Axenfeld and its close relative, the diplobacillus of Petit, are two organisms which appear to be peculiar to the eye and the nose. I have no records of their being found in any other situations. The Petit organism is so closely allied that I shall merely point point out its differentiating peculiarities and speak generally of the diplobacillus.

This organism produces a well-defined form of conjunctivitis, especially affecting the margins and angles of the lids, on account of which the disease is called "blepharo-conjunctivitis" or "angular conjunctivitis." It can also infect the cornea and produce ulceration of two distinct types, the one occurring in the course of a very profusely discharging conjunctivitis and the other in eyes where it is difficult, if not impossible, to detect any affection of the conjunctiva. For convenience, we call these the superficial or catarrhal, and the deep or central form.

The central ulcer is the more interesting from the bacteriological as well as the practitioner's point of view. It presents a certain resemblance to the pneumococcal ulcer, but the treatment and prognosis are so different that the two conditions should always be differentiated, and this will require a bacteriological examination. We have, therefore, an important diagnosis to make which necessitates the assistance of bacteriology, and which, with that assistance, is certain and easy.

The ulcer is usually found a few days after some slight injury which has broken through the epithelial surface; a faint grey infiltrate forms under the epithelium, the surface of which gives way and an ulcer results.

In proportion to its area the ulcer is deeper than the pneumococcal, the floor shows infiltrated spots and there is not the well-defined advancing edge of the true serpiginous ulcer.

It is exceedingly difficult to describe the slight differences which when taken all together make a clinical picture suggestive that the ulcer, is at any rate, not a pneumococcal one, for many claim that an exact diagnosis on its clinical appearance is not justifiable.

The diplobacillus is obtained from the infiltrated parts of the margins and floor of the ulcer, and can usually be found if a Gram-stained slide be carefully searched, if, however, there be only a few bacilli present, as sometimes occurs, simple inspection of a slide may not be sufficient to establish the diagnosis.

A culture on solidified blood serum is very characteristic, and can be accepted as diagnostic. The surface of the medium is excavated in regular depressions, which coalesce, and, finally, the whole medium dissolves.

The organism is not one which has any importance except to the ophthalmic bacteriologist. The other organisms we have considered are so well described in all the text-books that it is unnecessary to take time to repeat their characteristics. We have now to deal with something less known, and a few details may be advisable.

As the name implies, the bacilli tend to occur in pairs, end-on to each other; individuals are from 2-3 μ long and 1-1½ μ broad, they are slightly rounded at their ends, and occasionally show capsules. They are very readily and completely decolourized by Gram's method of staining and take the counter-stain, safranin, neutral red, or fuchsin, intensely.

Cultures can be obtained only at blood temperatures, and on media containing serum. The characteristic growth is that on *solidified blood-serum*, as already described; if the serum be cooked, the growth is poor and sometimes may even fail.

On *serum agar* the colonies form small translucent drops, which after a few days become brown and slightly opaque at their centres. The medium is often stained a dark-brown colour.

The diplobacillus of Petit resembles the other organism very closely, the difference being a more vigorous growth, which can occur at ordinary room temperature and on media not containing serum, such as pure gelatine or simple agar. The Petit organism from the eye, or recent culture, will also liquify gelatine, but this power is gradually lost after cultivation.

It has been suggested that this organism is merely a variation of the more common form due to peculiarity of growth. On one occasion I kept cultures of the Morax-Axenfeld and the Petit bacillus by repeated sub-cultures for four years and still found that the one always failed on pure agar, while the other always grew on it.

Ulceration due to Petit's bacillus is generally more severe than that due to the Morax-Axenfeld bacillus.

The importance of diagnosing this bacillus when present is due to the specific reaction which it has to sulphate of zinc, in the presence of which the bacilli fail to grow, although they are not necessarily killed by the salt. If a chip of wood be dipped into a culture, dried, then exposed to the action of 1 per cent. zinc sulphate for 10-15 minutes, and the salt washed away, growth still occurred; but the presence of a very slight trace of zinc sulphate in the medium arrested all growth. Here we have the indications for treatment, which consists in the repeated instillations of zinc sulphate into the conjunctival sac, and the syringing out of the floor of the ulcer with the same solution. Two grains to the ounce give the best results. Recently, I have tried ionization, applying a zinc electrode dipped in zinc sulphate to the ulcer with a current of 1-2 milliamperes for about one minute. The results have been very favourable.

The superficial or catarrhal ulceration occurs during an attack of conjunctivitis of the moist eczematous marginal type.

Small grey superficial infiltrates occur close to the margin of the cornea. These break down into shallow elongated ulcers, which tend to coalesce into a ring. With their formation, exacerbation, of all the irritative symptoms occurs.

The treatment is simply that of the conjunctivitis itself.

Ulceration of the cornea may occur in almost all the ordinary forms of acute conjunctivitis, the most important being that of ophthalmia

neonatorum. As however I have limited my remarks to those ulcers which may be called primary, these secondary ulcers can be merely mentioned now. I would like, however, to call your attention to the progress which serum and vaccine treatment is making with relation to ulceration occurring in acute conjunctivitis.

CLINICAL MEMORANDA.

ARTERIO-SCLEROSIS: THROMBOSIS OF THE CENTRAL VEIN OF THE RETINA: ACUTE GLAUCOMA: POSTERIOR SCLEROTOMY: IRIDECTOMY: ENUCLEATION OF THE EYEBALL: DEATH: PATHOLOGICAL EXAMINATION OF THE EYEBALL.

BY

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Henry B., aged 77 years, attended my out-patients at the Kensington General Hospital on September 22nd, 1906, complaining of a more or less sudden failure of sight in his left eye of one week's duration.

Present state.—The right pupil reacted well to light, but the left was almost motionless. R.V. 5/18. T.n. L.V., shadows at two feet. T.n. The right fundus showed no changes beyond some evidence of arterio-sclerosis. The left optic disc was a little blurred, and the fundus showed many large recent hæmorrhages.

The urine was acid, sp. gr. 1015, and contained neither albumin nor sugar. General examination of the patient showed that he was the subject of advanced general arterio-sclerosis.

Progress and Treatment.—*September 29th*, 1906.—White patches have made their appearance near the outer side of the left optic disc. *October 6th*, 1906.—R.V. = 5/36. T.n. L.V.=fingers near face. T.n. R.E. sclerotic changes present in the retinal arteries. L.E., numerous larger and smaller hæmorrhages scattered over the fundus. A white patch lies near the outer side of the optic disc. *October 20th*, 1906.—R.V. = 5/12. T.n. L.V. fingers at 1 metre. T.n. *October 31st*, 1906.—The tension of the left eye was noted as being slightly raised. *November 21st*, 1906.—R.V. = 5/18. T.n. L.V. = fingers near face. T. ? *plus*. The right fundus oculi shows no changes beyond those of arterio-sclerosis. *December 8th*, 1906.—R.E. tension normal. L.E. T. *plus* 1. Physostigmine drops (gr. 1 to the ounce) to be applied three times a day to the patient's left eye.

December 22nd, 1906.—By an unfortunate mistake on the part of the dispenser, the patient was supplied with atropine instead of physostigmine drops when he last visited the hospital, and these have been used to his left eye ever since. The left eye is now in a condition of typical sub-acute glaucoma, with tension *plus* 3 and vision reduced to perception of light. Under alypin, posterior sclerotomy was performed between the insertions of the external and superior recti tendons. *December 29th*, 1906.—The patient's eye has been easy since the 22nd instant. Under chloroform, an upward iridectomy-dialysis was performed upon the left eye. *January 16th*, 1907.—The iridectomy performed eighteen days ago is large and good. A little

blood lies in the lower part of the anterior chamber. A fair reflex can be obtained from the fundus, but no details can be recognized. V. = no p.l. T. *plus*. No details of fundus, although reflex is fair. Pain not severe. *March 23rd*, 1907.—Patient complains of severe pain in the eye, the tension of which is again high. V. = no p.l. Good anterior chamber

March 30th, 1907.—Under chloroform, the patient's left eyeball was enucleated. There was but trifling hæmorrhage during the operation. During the following night, however, blood came through the dressings, and the house-surgeon thought it advisable to remove the bandage and to plug the orbit.

The patient died on *April 6th*, 1907, seven days after removal of the eyeball, but as no autopsy could be obtained, it was impossible to state certainly what was the cause of death.

The enucleated eyeball, fixed in 5 per cent. formalin, was submitted to Mr. George Coats for pathological examination, and his report is appended:

"The microscopical details have suffered from imperfect fixation (? too weak formalin). However, the general features are sufficiently well shown. The first section is in the anterior level of the lamina cribrosa, and shows a small portion of the deep tissues of the papilla on one side. The central veins are already formed, and contain blood; the artery is collapsed and probably occluded, but it is cut obliquely. In the next two sections the central vein has disappeared, its place being taken by a little cellular tissue. A small patent branch is seen to one side, probably a collateral enlargement. In section No. 4 a small lumen has been re-established. In sections Nos. 7 and 10 the lumen is gradually enlarged by the accession of collaterals."

"Coagula are present between the nuclear layers of the retina, but the hæmorrhages seem to have been absorbed. Part of the retinal distortion is due to the fixation, but the nerve fibre and ganglion cell layers are obviously atrophic. The other changes speak for themselves. The retinal vessels are not very greatly diseased."

"The case seems to be one of organized thrombus in the vein, in which there has been time for all the inflammatory signs due to the organization to disappear."

A DERMOID GROWTH OF THE CORNEA IN A DOG.

BY

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AND

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RECENTLY one of us (R.W.) was shown a liver and white spaniel puppy, six months old, with two hairy growths on the cornea of the left eye. The larger of the two was about 3 mm. across and situated on the outer side of the cornea, the edge just touching the corneal limbus. It was brownish in colour, and growing from its surface were about ten stiff hairs exactly similar in appearance to eyelashes. These all pointed downwards, and probably their direction was due to the constant pressure of the upper lid; the hairs were about 3 mm. to 6 mm. in length. There was a much smaller growth, distinct from the former, below in the lower and outer quadrant of the cornea, with smaller hairs growing from it. The owner of the dog had noticed that the animal had had "a cold in the eye" for three weeks. The other eye was quite normal in appearance.

An attempt to dissect the larger growth off under chloroform failed, but it was easily removed under local anæsthesia, without penetrating too deeply into the corneal tissue. The eye quieted down in a few days, and on recent enquiry we learn that there has been no recurrence.

Wardrop, in 1834, quoted by Lang and Collins,* reports a somewhat similar case in a boy, in whom the hairs did not appear until the boy was 16, when

* Article "Congenital Malformations" in Norris and Oliver's *System of Diseases of the Eye*.

his beard began to grow. Possibly, there may have been a recent growth of hairs in the dog, and may account for the inflammation noticed by the owner of the dog for the previous three weeks. The same authors also refer to a specimen of a dermoid growth in a sheep's eye, preserved in the Royal College of Surgeons' Museum, which has wool sprouting from it. The

FIG. 1.—Photograph of the upper growth (about 6 diameters).

photograph (Fig. 1) gives a very good idea of the upper of the two growths as it appeared on the cornea.

My best thanks are due to Mr. Carless, a leading veterinary surgeon of this town, for the opportunity of seeing and operating on this case.

Pathological Report.—Longitudinal microscopic sections were made with some difficulty; the hairs were lying at various angles, no two being "oriented" alike, so that they appear cut in transverse, longitudinal, and oblique planes. The general arrangement of the tissue appears to be that of a dermoid growth (Fig. 2). It consists of epithelial layers, of which those near

FIG. 2.—Section of the upper growth, the free epithelial surface and oblique section of the hair follicles (about 50 diameters).

the surface are thin and flattened with very indistinct nuclei, whilst the more numerous and deeper layers are plumper as to their cells and have very well stained and evident nuclei. Embedded in this dermoid tissue are hairs which have a more or less normal structure and are furnished with ample pigment of a yellow-brown colour. The hairs vary enormously in size, some being as large as strong human eyelashes, and others scarcely visible to the naked eye. The appendages of the skin, glands of Moll and the sebaceous glands, are well seen in some of the sections of the growth.

THE TONOMETER OF SCHIOTZ.

BY

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THE tonometer of Schiötz appears to have met with but little recognition in this country, although it has been in use on the Continent for several years, and has been highly spoken of by those who have worked systematically with it.

As a preliminary note, therefore, a description of the instrument, with its method of use, may not be out of place.

Ophthalmotonometers, as is well known, have been devised for many years; they are of two kinds, impression tonometers and applanation tonometers, according to the principle on which they act.

Impression tonometers measure the depth of the indentation of the globe by a given weight or the weight necessary to produce a given depth. Applanation tonometers, on the other hand, measure the area flattened by a given weight or the weight necessary to flatten a given area.

Both kinds are inaccurate as compared with the manometer; but inasmuch as the latter requires perforation of the globe, it is, of course, inapplicable for clinical purposes.

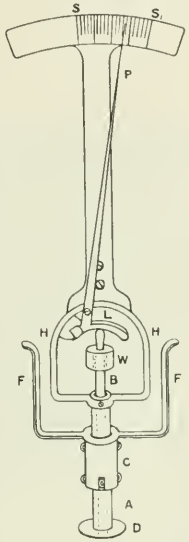
Although tonometers give only a relative measure of the intra-ocular pressure and are inaccurate on account of certain sources of error which cannot be eliminated, it does not necessarily follow that they are useless for clinical purposes.

Whatever tonometric instrument be employed, if it be thoroughly understood and carefully applied by the same observer, variations in the tension of an eye can be noted and recorded which escape digital estimation—the least accurate method of all. If a standard can be obtained for any given tonometer which will give the limits of what is estimated by digital impression to be normal tension, the value of such an instrument is undoubtedly increased and may fairly be relied on clinically. The writer is at present engaged on the examination of tension in normal eyes by means of the Schiötz tonometer, but does not consider that any number short of one thousand is likely to furnish trustworthy statistics.

Schiötz's instrument is an impression tonometer, and records the indentation of the surface of the cornea by one of several known weights. It is subject, to a certain extent, to the sources of error present in the application of all impression tonometers. They are chiefly that (1) the indentation of the globe is dependent on the curvature of the surface, a variable quantity in different eyes and in different parts of the same eye; (2) the indentation is dependent on the extensibility of the membranes, a variable quantity in different eyes; and (3) the intraocular pressure increases with any pressure upon the globe

such as the weight of the instrument and the pressure unconsciously exerted by the fingers in applying the instrument. In Schiötz's tonometer, however, the following advantages are present: the area impressed for the purposes of measurement has a diameter of 3 mm. only, the variations in curvature, therefore, of so small an area need hardly be taken into account; the pressure exerted by the fingers in steadying the instrument in place is practically *nil*, for the pointer will remain stationary, although the collar by which the instrument is held be moved gently up or down.

The weight of the tonometer itself is constant, and although it must produce a slight increase in the intraocular pressure, it need not be considered in comparative results.



A. Hollow cylinder with lower end (D) shaped to rest on cornea. B. Rod sliding in A. C. Collar movable on wheel bearings on A. F. Projections from C to hold the instrument. W. Weight slipped on over B. L. Curved lever giving movement to pointer P. S S. Scale in millimeters with zero at S. H. Horse-shoe shaped support for scale and pointer.

The instrument consists of a hollow metal cylinder (A) about 3·5 c.m. long, shaped at its lower end (D) to rest on the cornea, whilst to its upper end is attached a horseshoe-shaped support for the scale (SS) and pointer (P). The pointer has at its attachment a short curved lever (L), roughly at a right angle, which is moved by contact with a rod (B) sliding in the centre of the cylinder. This rod rests by its lower surface on the cornea, whilst the upper part, projecting above the cylinder, comes into contact by its rounded end with the curved lever of the pointer. One (W) of several known weights—namely, 5·5 grammes, 7·5, 10, and 15—can be slipped over the upper end of the rod, a small projection on which can be made to fit over a collar inside the weight and so prevent the rod from slipping out when the instrument is lifted

from the cornea. Surrounding the cylinder is a collar (C) with two L shaped projections (F) for the fingers to hold, friction between the two being much reduced by means of small wheel bearings.

The weight of the rod (4 grammes), *plus* the known weight slipped on, indents the cornea to a greater or lesser degree according to the tension of the globe, the amount of indentation is communicated, *via* the curved lever, to the pointer and is recorded on the scale.

The scale is marked off in millimeter spaces with a long mark at every fifth millimeter. They are not numbered, but in using the instrument it will be easily noted that the central end of the scale must be taken as zero.

For each of the known weights a curve is given on a chart supplied with the instrument, the horizontal axis representing the scale readings and the vertical axis the corresponding tension-value in millimeters of mercury.

To obtain an estimation of tension, the patient is placed on a couch with the head in a slightly backward position, whilst the eyes look upwards. The eye whose tension is to be measured is anæsthetised with a 1 per cent. or 2 per

cent. solution of holocaine, which acts rapidly and does not dilate the pupil. A good position in which to stand for either eye is a little behind the head on the left side, the right hand can thus be used to hold the instrument, whilst the fingers of the left lightly separate the lids. It is important that no pressure be exerted on the globe by the desire to close the lids, since a forcible attempt at contraction will move the pointer through two gradations on the scale.

The instrument is got ready by placing the rod in the cylinder and slipping on the 5·5 gramme weight. The patient is directed to fix a point

vertically above him on the ceiling, and the tonometer is gently applied to the cornea with the scale facing to the patient's left, so that the zero is away from the observer. The latter is thus enabled to make his own observations, a point not without importance. With an eye estimated by the fingers to be of normal tension, the pointer will give a reading somewhere between 2·5 and 6 mms.; if the tension is raised, the reading will be lower, and the next lowest weight, 7·5 gm. should be substituted and so on until a reading between 2 and 4 is obtained. By taking readings between these near limits, it can be readily understood that the cornea is indented in a correspondingly limited degree in different eyes, and thus one of the sources of error is reduced. It is advised to take the mean of three readings, but this does not appear to be always necessary. A point of interest is the pulsation of the eye transmitted to the pointer. Some eyes show this in a marked degree, whilst others show practically none. The clinical significance of this from an ocular point of view remains to be seen.

If the instrument be carefully applied, no effect is produced on the cornea, but with a restless patient, or if gentleness be not observed, the corneal epithelium may be abraded.

After use, it is important to clean with alcohol or ether the parts of the instrument which have been in contact with the fingers or the cornea, and especially the rod and its groove.

The diagram illustrates the important parts of the instrument and the photograph shows it in use.

METHODS OF DEALING WITH THE SOFT MATTER IN CATARACT OPERATIONS.

BY

G. H. FINK,

MAJOR I.M.S. (RETIRED).

Improvements in the methods of operating for cataract are constantly being devised. The desideratum is how to deal with soft matter left behind after the operation for mature as well as for immature cases of cataract.

The usual plan of applying pressure from without is, in many cases, ineffectual, for more or less soft matter is frequently left behind, which may excite iritis, or may lead to the subsequent formation of a secondary cataract. The two alternative methods left are intra-capsular irrigation and expression of the lens whole in its capsule. The latter operation has lately received great attention from various observers, some advocating the methods used in the *technique* employed by Lieut.-Col. Henry Smith, I.M.S., others condemning it, because of certain difficulties, and the large percentage of escapes of vitreous in their hands, as well as in the cases they have seen operated on by others.

It is because of the difficulties presented in the above cases, as well as the fact that intra-capsular irrigation does not always seem to meet with full success as regards soft matter lurking behind the iris that I feel justified in making the following suggestions:—

(i) **Where the soft matter is left behind, more or less, and excites iritis, or leads to subsequent formation of a secondary cataract.**—In such a class of cases—which, to my mind, are more frequent in operating on immature cataracts than in mature ones—I feel strongly that the dilatation of

the pupil is an important matter, for we are able to see a wider field by enlarging the pupil, and thus gain sight of more of the fragments (large or small) which are left behind, and which often lurk behind the iris. It is important to catch sight of these fragments, and to try to deal with them by pressure from without, or irrigation by the intra-capsular method. Both these methods often fail to bring all the soft matter away. Hence, I would suggest that a suitable strength of a papain or enzymol solution be dropped, with a medicine dropper, into the anterior chamber, through which it gains entry into the capsule and acts upon the soft matter after a little time, when the fragments could then be removed more easily by further irrigation with an antiseptic. The dangers of the secondary results would be thus removed.

(ii.) **Where the danger of large escape of vitreous is feared.**—This does occur in the hands of those who have tried the operation by the *technique* now known as "Jullundur Smith's" in whose hands it has met with success, although still a fair percentage of escapes of vitreous occurs. The eclectic methods of operating when expressing the lens whole in its capsule seem to give the least escapes of vitreous, as I have shown by results already published. I still maintain that we are justified in adopting those methods, which, to my mind, are the most scientific.

THE OXFORD DIPLOMA IN OPHTHALMOLOGY.

Now that the first examination for the Diploma in Ophthalmology instituted by the University of Oxford is completed, some account of the curriculum and of the examination may be of interest to readers of THE OPHTHALMOSCOPE.

To begin with, candidates, according to the statute governing the examination, must be registered medical practitioners, or being graduates in medicine of universities outside the United Kingdom, their degrees must be approved by the Board of the Faculty of Medicine of the University of Oxford. In addition to that, they must produce evidence of having studied clinical ophthalmology for a period of at least one year at a hospital recognized as adequate for the purpose by the same Board.

The course for the Diploma commenced on May 4th, when the candidates, who numbered fifteen, met Dr. G. J. Burch, F.R.S., who was deputed by the Professor of Physiology to deliver the lectures in the department of physiology. Names were entered and fees paid. The lectures began on the 4th at 2 o'clock p.m. with anatomy, by Professor Arthur Thomson. The lecture lasted for an hour, and was illustrated with the lantern. After that, members of the class made their way to the Eye Hospital, situated about three-quarters of a mile distant from the University Museum where the lectures on anatomy and physiology were delivered. At the Hospital cases were demonstrated and lectures given by the Margaret Ogilvie Reader in Ophthalmology in the University, Mr. Robert W. Doyne. That gentleman also set an examination paper on each occasion which candidates were expected to answer and to return during the following week. The class next returned to the University Museum, where Dr. G. J. Burch lectured for an hour on the physiology of the eye. A break was then allowed for dinner, after which another attendance was made at the Eye Hospital, where pathological and

bacteriological specimens were demonstrated, or some subject of ophthalmological interest was discussed by the Reader or by his able assistant, Mr. P. H. Adams, surgeon to the Hospital.

At 9 o'clock a.m. on the following day, Thursday, a second lecture on physiology by Dr. Burch was attended, and this was followed by three hours' practical work in the physiological laboratory under the direction and guidance of the same gentleman. At 2 o'clock p m , Professor Arthur Thomson lectured upon anatomy; and, after that, another hour or so was devoted to work in the physiological laboratory.

It will thus be seen that the essentials of the course could be fulfilled by candidates who lived at a distance from Oxford between mid-day Wednesday and Thursday evening. The wisdom of this provision was shown by the fact that candidates came from London, Liverpool, Newport, Taunton, and in one instance from a district so remote from Oxford as the south of Ireland. The course extended over one term in the respective departments.

Towards the end of the term (July 11th to July 16th), a week of advanced lectures was given by lecturers mainly drawn from outside the instructional ranks of the University itself. The lectures covered a wide range of subjects. The lecturers included Mr. Walter Jessop, Mr. Priestley Smith, Mr. Leslie Paton, Dr. Hill Griffith, Mr. Holmes Spicer, Mr. E. Treacher Collins, Mr. J. B. Lawford, Mr. Sydney Stephenson, Mr. Howell Evans, Dr. Risien Russell, Mr. Stephen Mayou, and Mr. Angus MacNab. Candidates for the Diploma were expected to attend this course of lectures, many of which were interesting and most instructive.

The fees payable for the curriculum were as follows:—anatomy, £2; physiology, £2; ophthalmology, including the advanced lectures, £8 8s.

After getting their certificates signed by the different lecturers concerned in the course, candidates forwarded their schedules to the Assistant Registrar of the University, together with the statutory fee for examination of £15, unless the candidate is a graduate of the University, in which case it is £10 only.

The examination itself was held on July 19th and 20th in the Examination Schools of the University. On the first day papers* were set in three subjects, *viz.*, 1. Dioptrics; 2. Relation of Ophthalmology to General Medicine; and 3. Pathology. On the morning of the second day the paper was on the 4. Abnormalities and Diseases of the Eye and its Appendages, their Etiology, Pathology, Diagnosis, and Treatment. The afternoon of the 20th was devoted to a clinical examination at the Eye Hospital, where each candidate was given two cases, and allowed one hour and a half to write an account of each. On July 23rd the *viva voce* examination was held by the examiners, Professor Osler and Messrs. E. Treacher Collins and J. B. Lawford, at the Eye Hospital, where jelly specimens, microscopical slides, and patients were collected.

Names of the successful candidates follow: Adams, P. H.; Allen, Mabel E.; Curran, E. J.; Burdon-Cooper, J.; Cridland, A. Bernard; Gidney, Major H. A. J., I.M.S.; Stephenson, Sydney; Waddy, R. Granville.

The examination will be held annually, and will begin on the third Tuesday in the month of July.

Further information can be obtained from the Assistant Registrar, Old Clarendon Building, Oxford.

*For questions set see THE OPHTHALMOSCOPE. August, 1910, page 605.

OXFORD OPHTHALMOLOGICAL CONGRESS.

INAUGURAL DINNER AT KEBLE COLLEGE.

The inaugural dinner of the Oxford Ophthalmological Congress was held in the Hall of Keble College on the evening of Thursday, July 21st. The chief guest was Dr. Warren, the Vice-Chancellor of the University. Sir Anderson Critchett, Bart., C.V.O., in the chair, was supported by Mr. R. W. Doyne (Master of the Congress), Professor Osler (Regius Professor of Medicine), Mr. Charles Higgens (President of the Section of Ophthalmology British Medical Association), and Mr. Sydney Stephenson (Hon. Secretary), together with a number of other distinguished ophthalmic surgeons, both English and foreign, amounting in all to about one hundred. Amongst the foreign visitors were Professors Lagrange, Holth, Heine, Stanculeanu, and Rémy.

At the conclusion of dinner, Sir Anderson Critchett, in a well-worded speech, proposed the health of the Vice-Chancellor, and took the opportunity to refer in enthusiastic terms to the Diploma of Ophthalmology recently constituted by the University, in which Dr. Warren had greatly interested himself.

The Vice-Chancellor, in acknowledging the toast, gave a hearty welcome to the Congress, and referred to the Oxford School of Medicine. Under Sir Henry Acland, Sir John Burdon-Sanderson (with whom the present Master of the Congress had been associated as a pupil), and now Professor Osler, the School had grown from a fledgling to its present position. This year it had taken the lead by establishing a diploma in ophthalmology, the first in the world. There were two points, however, to be considered with respect to the diploma, first, as to how much it might interfere with the teaching in the London field, and, secondly, that the subject might be considered too technical. He nevertheless felt that ophthalmology was the most scientific amongst the specialities, and that it required special teaching which would in no way interfere with the clinical teaching obtainable in other schools. The name of Doyne was bound up with the diploma, in that he had been its founder and that by his energy he had established as a reality what at first had been thought to be a shadow only. In conclusion, the Vice-Chancellor tendered his thanks to the Chair for the encouragement extended to this branch by the Congress, and emphasized the position which Oxford had assumed by the institution of the "D.O." He considered that other specialities in medicine had a right to a diploma, but that they must establish their claims.

Mr. Charles Higgens, in wishing success to the Congress, referred to the claims the Congress had in the establishment of the diploma and the prominent part Professor Osler had played in its creation.

Professor Osler, in a humorous speech, regretted that he was not an ophthalmologist. He had always been struck with the facial development of ophthalmic surgeons in general, and had so far been unable to decide whether their good looks had made them embrace this branch of their profession or whether its practice had rendered them so. He was inclined to the latter view, for on looking to-night at Sir Anderson Critchett and Mr. Higgens, whom he had known in the "seventies" at Moorfields, he would never have dreamed that two homely-looking men, as they then appeared to him, could develop into such as they were now. Referring to the claims which Oxford held to ophthalmology, the name of Walter Bayley, of New College, stood out as the writer

of the first work on the subject published in England, and a most successful one, judging by the number of editions issued. In the past six years' work the Congress had a guarantee for success, and Professor Osler pointed out the advantages that accrued to men by their attendance at such meetings. He felt that the diploma in ophthalmology was of importance, not to Great Britain alone, but to Europe generally.

Mr. Hill Griffith thanked the Warden of Keble College for his kindness in allowing the use of the buildings for the Congress, and trusted that he would continue to grant the privilege. The Sub-Warden, in the unavoidable absence of the Warden, suitably acknowledged the thanks.

The Congress then adjourned to the Junior Common Room, where informal discussions took place, amongst them being the establishment of the diploma. The general view appeared to be strongly in its favour. B. C.

THE VETO OF "OPTOMETRY" IN OHIO.

The following is the text of Governor Harmon's veto of the Optometry Bill, which passed the legislature in Ohio. It is given in full because of its straightforward reasoning and common sense attitude on this abuse. The campaign of education on this dangerous movement seems to be bearing fruit. Governor Harmon also refused to reconsider his veto in spite of the efforts of the Ohio Optical Association.

To the General Assembly:

Amended Senate Bill No. 51, entitled "A bill to regulate the practice of optometry," creates a board of five members to examine and license persons to practice "optometry," which it defines as "measurement of powers of vision and adaptation of lenses for the aid thereof by any means other than the use of drugs, medicine or surgery."

The express exemption of mere dealers in spectacles and eye-glasses, and the requirement that the examination shall include "anatomy and physiology of the eye" as well as "optics and such other subjects as said board may decide to be suitable and proper," show that the proposed license is to cover something more than the mere commercial supplying of eye lenses to customers. That something is necessarily, from its nature, a part of the field covered by medical science. Our statute (G. C. 1286) includes in the definition of that field the prescribing, advising, recommending, administering or dispensing, for a fee or compensation, not only of drugs or medicines, but of appliances for the cure or relief of a bodily injury, infirmity or disease. It is beyond question that the eye is so connected with the general system that the subject of impaired or imperfect vision cannot properly be considered as though it were an independent function, and it is conceded that, especially with children, the condition and needs of the eye cannot, in a great many cases, be known without the application of drugs for dilatation, as well as the examination of other bodily conditions.

A step downward.—So to set men, who have not themselves had medical education and stood the careful tests required by law in the interest of the public health, to examine and license others to deal with one of the most delicate and important organs, appears to me a step downward leading to grave peril. And if what may be called the mere mechanical treatment of defective vision is to be made a special branch of medical practice, it should

be under the jurisdiction of the State Medical Board, so that the proper qualifications may be judged by men of approved education and training in the general science which deals with the ills of the human body, But I know of no special branch of medical practice which is itself split up as is proposed here. All other special branches are complete in themselves, and no one is permitted to engage in them unless he is qualified to diagnose and deal with cases in all the aspects they may present. One who is not skilled in optical surgery and medicine surely cannot be safely trusted to tell whether these are not required instead of the mechanical treatment he is able to give, and the time lost in discovering the need of these will often make resort to them useless.

Schools not adequate.— Schools of optometry are mentioned in the bill, but it is shown by the evidence presented to me that such as there are generally, if not always, lack the requirements of proper education for so important an art as treating the human eye. Many of them are mere correspondence schools.

It is quite true that dealing with vision ought to be strictly regulated, because, to common knowledge, much harm is done by itinerant and other persons who profess to supply the needs of the people. But I do not think this bill furnishes the proper means of regulation. On the contrary, by giving the authority of the state, many who lack the proper education and training, as this bill would, in my judgment, do, the public would be misled as to their qualifications. Those so lacking would undoubtedly outnumber those who merely by special talent and practice would acquire a certain proficiency, as men do in all callings. Druggists often gain a knowledge of disease and their remedies as extensive as some physicians have, yet they are not permitted to apply that knowledge in practice, because such cases are exceptional.

For this reason I herewith file the Bill with the secretary of state, unapproved.

JUDSON HARMON,
Governor.

May 17th, 1910.

The Ophthalmic Record, July, 1910.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I—COMPARATIVE ANATOMY AND PHYSIOLOGY.

(1) Franz, Victor.—Photographs with ultraviolet light of the bird's eye. (Photographien mit ultraviolettem Lichte vom Vogelauge.) *Arch. f. vergleichende Ophth.*, Bd. I, Heft. iii, S. 283, 1910.

(2) Abelsdorff, G.—On the behaviour of the pecten in the accommodation of the bird's eye. (Ueber das Verhalten des Pekten bei der Akkommodation des Vogelauges.) *Arch. f. vergleichende Ophth.*, Bd, I, Heft. iii, S. 290, 1910.

(3) **Vollaro, A. de Lieto.—New contributions to our knowledge of the finer comparative morphology of the cells of the substantia propria of the cornea.** (Neue Beiträge zur Kenntnis der feineren vergleichenden Morphologie der Zellen der Cornea propria.) *Arch. f. vergleichende Ophth.*, Bd. I. Heft iii, S. 334, 1910.

(4) **Schock, Karl.—The terminal distribution of the sympathetic nerve in the iris.** (Die Endausbreitung des Nervus sympathicus in der Iris.)

(1) In this paper **Franz** attempts to clear up some obscure points in minute histology by means of photographs with ultraviolet light. According to the commonly accepted view, the outer limbs of the rods and cones are composed of superimposed platelets, and it has been supposed that in the cones they give rise to colour vision by causing diffraction. Some authors believe, however, that the appearance of platelets is due to a spiral fibril coiled up in the manner of a spring. In photographs with ultraviolet light this explanation appears to be upheld, at least for the rods; in addition, the longitudinal markings are well shown, and are seen to be due to a channelling or grooving of the surface. In the second part of the paper certain structures on the surface of the pecten are described. They consist of fine fibrils ending in a little cap from which a hair projects. Their significance seems to be uncertain.

GEORGE COATS.

(2) The function of the pecten in birds is not yet fully elucidated, although its extreme vascularity is evidence that it must be a very important organ. It has been supposed to act as a sort of sunshade to protect the retina from excessive light. Its relation to accommodation has been variously interpreted; by becoming congested and swollen, according to some, it drives the lens forwards either directly or through the medium of the vitreous; others look upon it as an organ for the perception of the accommodative movements of the lens; while others believe that its function is to compensate for variations of tension produced during the accommodative act. According to all these theories, some movement, whether change of position, swelling, or shrinkage, must take place during accommodation, which should be observable with the ophthalmoscope. In putting the matter to the test of experiment, however, the difficulty is met with that the slightest movement of the animal, or of the eye or nictitating membrane, imparts a transmitted motion to the freely floating membrane In order to overcome this difficulty, **Abelsdorff** curarised the animals, and then stimulated the accommodation electrically. He found that the pecten made no movement whatever, and therefore concludes that whatever its optical or sensory functions may be, it is not directly concerned in accommodation, but may have to do with the nourishment of the vitreous.

GEORGE COATS.

(3) The gold and silver impregnation methods commonly in use for demonstrating the corneal corpuscles, while they show the coarser outlines of the cells, do not bring out well the finer details of structure. Owing to the use of acids, swelling is apt to take place, and the anastomoses often become broken. By employing a special modification of the phospho-molybdic-hæmatoxylin method (for details of which the original should be consulted) **de Leito Vollaro** succeeded in obtaining much better results. In this paper he gives a general survey of his researches on a large number of mammals, birds, reptiles, and amphibians, and promises a more detailed study of the different groups on a subsequent occasion. He follows Ranvier in dividing the cells into a corpuscular form, with freely branched processes like bone corpuscles, and a membranous, in which the processes are broad and little branched, the cells forming by their anastomoses a semi-continuous system.

The latter is, on the whole, the higher form, but it was found that a grouping of the corneal corpuscles according to their form did not correspond, with any degree of closeness, with the natural orders of the animals. At most, it would be possible to recognise the family, not the species. Not only may there be considerable variation between the corpuscles of closely allied animals, but even between the cells in different layers of the same cornea. The type of branching also, whether tree-like or straight, varied rather with the layer of the cornea than with the species of animal. The shape of the cells varies enormously; they may be quadratic, round, triangular, stellate, pyramidal, ovoid, elliptical, etc., and are seldom of the same form in all the layers of the cornea. GEORGE COATS.

(4) Much obscurity still prevails as to the terminal distribution of the sympathetic in the iris. In the absence of a thoroughly reliable method of demonstrating unmedullated fibres, technical difficulties are considerable, especially since certain metal impregnation processes, such as those of Ramon y Cajal and Bielschowsky, which give good results in the central nervous system, are inapplicable to the iris, owing to the strong affinity of the ordinary stroma cells for the metal. Hence, it is not surprising that varying, and even contradictory, accounts have received the sanction of good authorities. Inasmuch as the pupil of the freshly excised globe is said to respond to light and atropin, it has been supposed that local nerve centres must be present within the iris, and structures, possibly of ganglionic nature, have been described by Arnold and others. It is doubtful, however, whether ganglion cells have really been demonstrated, although they are supposed to occur in the ciliary body and choroid. In the present research, **Schock** used a modification of the method of Munch, for details of which the original should be consulted. In addition to the ordinary stroma cells, he describes a system of smaller round or spindle-shaped cells with large oval nucleus and scanty protoplasm: they are unpigmented, and have delicate branching processes which form an intercommunicating network with nodes at the crossing points, and varicosities on the fibrils. He believes that these represent multipolar ganglion cells. They are often connected with the stroma cells, and sometimes send into them a fibril which may end in a structure resembling an end organ. It will be remembered that Munch has described the stroma cells as of muscular nature, so that this body may be allied to the end plates in muscle elsewhere in the body. Schock compares the network of cells to the plexuses of Auerbach and Meissner in the intestine. GEORGE COATS.

II.—AFFECTIONS OF THE EYE IN ANIMALS.

(1) **Knape, Ernst V.—Œdema of the cornea in the cat.** (**Œdema corneæ bei der Katze.**) *Arch. f. vergleichende Ophth.*, Bd. I, Heft iii, S. 330, 1910.

(2) **Schock, Karl.—An undescribed affection of the cornea in the dog.** (**Eine noch nicht beschriebene Hornhautaffektion beim Hund.**) *Arch. f. vergleichende Ophth.*, Bd. I, Heft iii., S. 313, 1910.

(1) In a cat whose sight had been failing for some months, **Knape** found the cornea thickened from two to five times, owing to a swelling and œdematous infiltration of the lamellæ. The epithelium was hypertrophied,

the membrane of Bowman indistinguishable, the membrane of Descemet thickened. There was no vascularisation or inflammatory infiltration. The endothelium was absent. Knape suggests that, perhaps in consequence of an iridocyclitis, the endothelium had been destroyed, and that in this manner the aqueous had gained access to the corneal stroma.

GEORGE COATS.

(2) In three cases **Schock** has seen an affection of the cornea in dogs which has the following characters.—Without evident inflammation or photophobia, an opacity develops of trapezoid or rounded shape. It appears to be in the most superficial layers; the surface is flat and bright; no vessels are present; and the edge is defined by a line of denser opacity. The cause is obscure, and it does not seem to be associated with distemper. Schock thinks it is possibly an atypical form of interstitial keratitis, perhaps allied to keratitis disciformis, which, however, is situated more deeply in the cornea than the present affection. GEORGE COATS.

III.—OPHTHALMOTONOMETRY.

(1) **Langenhan, F.**—Contributions to ophthalmotonometry. (Beiträge zur Ophthalmotonometrie.) *Zeitschrift f. Augenheilkunde*, March, 1910.

(2) **Marple, W. B.**—Some observations on the use of the Schiötz Tonometer. *Trans. American Ophthalmological Society*, Vol. XII, part II, 1910, p. 552.

(1) According to **Langenhan**, of Berlin, tonometers may be classified as "impression" tonometers, or "applanation" tonometers. Among the former are v. Graefe's, Hamer's, Donders', and Priestley Smith's, while Weber, Maklakoff, and Fick have invented applanation tonometers. On theoretical grounds, applanation tonometers are better than impression tonometers, for the resistance to indentation depends not only upon the internal tension, but upon the elasticity of the sclera. The best instrument is a new one invented by Schiötz (see *Archives für Augenheilkunde*, 1905, Bd. 52, S. 401, and 1909, Bd. 62, S. 317). Schiötz' instrument is really an impression tonometer, but he has shown that although there are theoretic disadvantages in this form, yet practically they are non-existent. Using this instrument, Langenhan has arrived at the following conclusions.—Schiötz' tonometer in skilled hands is, for clinical use, the best instrument for determining intraocular tension. The normal tension of the human eye varies from 18·0 mm. to 27·0 mm. Hg. 21·0 mm. Hg. is the usual figure. Neither holocaine nor atropine influences the tension of normal eyes. Tenotomy and advancement tend to lower tension. High-grade myopia does not cause low tension. Disease of the cornea and sclera, especially sclero-keratitis, may induce high tension. Intra-ocular tumours, in an early stage, are more usually accompanied by lowered than by raised tension.

The behaviour of glaucomatous eyes, when treated with myotics, is variable. In general, pilocarpine acts more feebly but more constantly than eserine. With eserine there is sometimes a preliminary rise of tension in glaucoma when the tension is not very high.

It is not good practice to drop myotics into normal eyes which are disposed to glaucoma. The great lowering of tension may be followed by the first attack of acute glaucoma.

No stronger solution of eserine than ½ per cent. should be employed in routine practice.

The combination of cocaine and eserine should be avoided in the treatment of glaucoma.

Tension is rapidly regained after cataract extraction, generally within a few weeks.

T. Harrison Butler,

(2) **Marple**, of New York City, has an instructive article on the Schiötz tonometer*, an instrument the use of which was demonstrated by Mr. Bernard Cridland at the recent meeting of the Oxford Ophthalmological Congress.

After describing and illustrating the instrument, Marple tells us how to use it. Holocaine or cocaine (2 per cent.) is applied to the eye and after waiting for a few minutes, the tonometer may be applied. Three observations upon each eye can be taken in the course of five minutes. The readings are accurate, and after a little experience, it is easy to become expert in the use of the instrument. Schiötz, in his first report, gave the normal tension as varying from 24 mm. to 31 mm. Hg. and as averaging about 26 mm. Further experience with the tonometer, however, led him to modify his views, and to estimate tension as ranging from 15.5 mm. to 25 mm. Hg. Marple's figures, dealing with a considerable number of observations (94 eyes), range from 13 mm. to 24 mm. Hg. The average tension was 19.5 mm. He would regard as suspicious any eye the tension of which rose above 25 mm. or 30 mm. Hg.

Marple has been unable to discover any uniform difference in the tension of normal eyes in patients of different ages, neither has he found any particular differences in the tension of hyperopic and myopic eyes.

In normal eyes the employment neither of mydriatics nor of myotics causes any appreciable alteration in the tension.

In glaucoma the tension ranged from 33 mm. to 134 mm. Hg. (one case of absolute glaucoma). Marple has never seen a case of glaucoma where the tension did not exceed 30 mm. Hg. A fall could be demonstrated after the use of myotics or the performance of an iridectomy.

Anything below 14 mm. Hg. is to be regarded as evidence of hypotony.

Marple's experiences lead him to think that the Schiötz tonometer is an indispensible part of the skilful oculist's armamentarium. Its greatest value is in determining low degrees of tension and in excluding plus tension. The finger is a most untrustworthy guide as to intra-ocular pressure. Even when the necessary *tactus eruditus* has been acquired, tension is not recognised as "raised" unless it is above 35 mm. Hg. or as "lowered" unless it is as low as 10 mm. Hg. A rigid sclera often gives to the finger the impression of increased tension, when the tonometer shows it to be normal.

Sydney Stephenson.

IV.—BACTERIOLOGY.

(1) **Oreste.—Penetrating wound of the eyeball from a blow of a whip lash (infection by the bacillus perfringens). (Plaie pénétrante du globe par coup de fouet (infection par le bacillus perfringens.)** *Ann. d'Oculistique*, janvier, 1910.

* The instrument is made by N. Jacobsen, Pilestraedet, 125, Christiana, Norway. In this country it is stocked by Messrs. Weiss and Messrs. Down Bros. respectively.

(2) Pascheff.—Streptococcal orbital abscess in a patient suffering from malarial cachexia. (Abcès de l'orbite à streptocoques chez un malade atteint de cachexie malarienne.) *Ann. d'Oculistique*, janvier, 1910.

(3) Ruata, Vittoria.—Concerning a cocco-bacillus of the human conjunctiva. (Sopro un cocco-bacillo della congiunctiva umano.) *Archivio di Ottalmologia*, July, 1909.

(4) Gradle, Harry S.—Bacteriological examination of the conjunctival sac previous to cataract extraction. *Archives of Ophthalmology*, July, 1910.

(5) James, R. R.—A contribution to the bacteriology of panophthalmitis. *Trans. Ophth. Society U. K.*, Vol. 30, Fasc. 2, p. 179.

(6) Terlinck.—A mixed infection of the conjunctiva. (Infection conjonctivale mixte) (Morax-Weeks). *Bull. de la Société Belge d'Ophtalmologie*, 1910, p. 18.

(7) Terlinck.—Infection of the vitreous body by a non-liquifying fluorescent bacillus. (Infection du corps vitré par bacilli fluorescent non liquéfiant.) *Ibidem*, p. 19.

(8) Terlinck.—Benign post-operative infection by a hitherto undescribed micro-organism. (Infection post-opératoire bénigne par un micro-organisme non encore décrite.) *Ibidem*, p. 21.

(1) **Oreste** records a case of panophthalmitis following an injury to the eye with a whip lash. The interest of the communication depends on the bacteriological examination which shewed the presence of large numbers of the bacillus perfringens, injection of a culture of which into the vitreous of a rabbit's eye caused panophthalmitis in 24 hours. Other organisms present were the bacillus subtilis and a diplococcus without any distinctive characters. In smear preparations there were degenerated mono- and polynuclear leucocytes. From the large numbers of the organism that were present, from the degeneration of the leucocytes, and from the presence of a peculiar peritoneal facies accompanied by vomiting and high temperature, characteristic of infection with anærobic organisms. Oreste considers that the panophthalmitis in this case was caused by the bacillus perfringens, but that the bacillus subtilis may have aided in its development. R. J. COULTER.

(2) **Pascheff** records the case of a patient suffering from malarial cachexia who developed an orbital abscess with reduction of the vision of the eye to counting fingers at 80 centimetres. On evacuation of the pus, the vision at once increased to counting fingers at 3 metres and in 25 days it was 6/10 with normal fields. There was no injury and no disease of the nose or accessory sinuses, but there was a cicatrising wound on the front of the upper third of of the right tibia. The pus from the orbit contained streptococci, which were experimentally proved to be pyogenic. The author, after carefully investigating the case, concludes that the abscess was of metastatic origin.

R. J. COULTER.

(3) **Ruata** has isolated from a culture taken from a case of membranous conjunctivitis an organism, which resembles the gonococcus and its congeners, the m. catarrhalis and m. intra-cellularis meningitidis. The new organism is Gram-negative and is somewhat similar morphologically to the three organisms mentioned, but is more variable in size and slightly more elongated. It

grows comparatively easily on most nutrient media, and has the principal distinguishing feature that it causes fermentation of all the sugar media, more or less markedly, whilst the others do not.

Ruata's cocco-bacillus is pathogenic in rabbits, causing panophthalmitis when injected into the eye; but it does not affect the normal human conjunctiva. LESLIE BUCHANAN.

(4) The recent discovery by Elschnig and Ulbrich (v. Graefe's *Arch. f. Ophthal.*, Bd. LXXII, Heft 3) of the importance of streptococci in the conjunctival sac before extraction of cataract has rendered it necessary to examine the conjunctiva bacteriologically before operation. Axenfeld maintains that can be done more readily by means of smears than by cultures. In order to verify this statement, **Gradle**, of Prague, undertook the investigation which he describes in the present communication. A smear was taken from the lower conjunctival sac by sweeping the latter with a platinum loop and including, if possible, any filaments of mucus or pus that might be present. The smears thus obtained were stained with methylene blue and Gram. Cultures were made by the serum-bouillon method described by Elschnig and Ulbrich. The bacterial contents of the conjunctival sacs were then investigated after the eyes had been bandaged for from three to twelve hours.

Gradle speaks only of streptococci, grouping all the other bacteria together. Fifty eyes were examined by him by cultural methods, and streptococci were found in 29 cases. In 16 of these 29 cases streptococci were found in smears, while in the 21 culturally sterile cases streptococci were found in smears where they had failed to show by cultural methods. In 9 of these 50 cases other bacteria were found in culture, while in 4 cases only were these bacteria found in smears. Thus, these results agree in 27 cases, giving a percentage of 54. In 32 cases a bandage was applied for from two to twelve hours, but in three cases only were bacteria found after bandaging where previous search had not revealed them. The author describes the following method, devised by Elschnig, for the benefit of surgeons who have not the resources of a bacteriological laboratory at hand.—Instead of mixing normal horse serum with bouillon each time a culture is required, ½ cc. of normal sterile horse serum is evaporated to dryness by a vacuum process in a plugged test-tube, and the necessary quantity of bouillon (½ to 2 cc.) is hermetically sealed in a small glass phial. When a culture is required, the top of the phial is broken off and its contents are poured into the test-tube, which can be heated to 60° C. if there be any doubt as to its sterility. After shaking for a few minutes, the serum dissolves and forms a slightly opalescent fluid.

The author concludes that the smear method of examining the conjunctival sac for streptococci is neither trustworthy nor adequate, neither does the application of a bandage for any length of time simplify this method.

SYDNEY STEPHENSON.

(5) **James**, of London, had a case in which panophthalmitis followed an injury by a piece of metal. Amongst the organisms found (streptococcus, staph. aur. and alb. was a gas-producing bacillus, which had many of the characters of B. aerogenes capsulatus (Welch). This is a large Gram-positive, non-mobile, non-sporing organism, which, as its name implies, produces gas in the course of its growth. The usual impression regarding this organism is that it is non-pathogenic, and, in consequence, it is probable that it was only a saprophyte in this instance. Its occurrence is, however, very rare in such cases. LESLIE BUCHANAN.

(6) The preparations shown by **Terlinck**, of Brussels, contained many Koch-Weeks' bacilli and a smaller number of the Morax-Axenfeld organisms.

SYDNEY STEPHENSON.

(7) The eye of a child, aged $6\frac{1}{2}$ years, was removed thirteen days after a penetrating injury by glass, and **Terlinck**, of Brussels, made a bacteriological examination of a particle of pus that was found in the vitreous humour near the original wound. Cover-glass preparations showed only a Gram-negative bacterium. Upon gelatine, agar, and serum a pure culture was obtained of the same micro-organism. It was slender, mobile, and, as already said, did not stain by Gram's method. On bouillon and gelatine it gave a beautiful fluorescence. It did not liquify the last-named medium. It did not coagulate milk. Injected into the anterior chamber of rabbits, the organism excited a violent irido-cyclitis, but without always entailing serious definitive anatomical lesions. Injected into the vitreous body, it provoked suppuration, going on finally to phthisis bulbi. Terlinck, who believes that this micro-organism was the cause of the localized suppuration present in the vitreous of his patient's eye, identified it with the *bacterium putidum* of Flügge, and repels the suggestion that it might have been the *bacillus pyocyaneus*.

SYDNEY STEPHENSON.

(8) From a pseudo-membrane which covered the wound six days after the extraction of cataract from a patient of 72 years, **Terlinck**, of Brussels, obtained a small, polymorphus, Gram-negative bacillus, which liquified gelatine rapidly and which grew quickly upon agar, producing a fœtid odour. Inoculation of the anterior chamber of the rabbit gave rise to panophthalmitis, with perforation. Death from septicæmia followed a few hours after inoculation of the bacillus into the peritoneal cavity of the usual laboratory animals. A similar micro-organism, it appears, has been found by Jacque and Masay in pus from a case of meningitis and abscess of Douglas' pouch, and has been named by them *streptobacterium fœtidum*.

SYDNEY STEPHENSON.

V.—THE SPECIFIC RELATIONSHIP BETWEEN RETINA AND KIDNEY.

Nedden, zur.—On the specific relationships between the retina and kidneys, with remarks on the ætiology of albuminuric retinitis. (Ueber specifische Bemerkungen zwischen Netzhaut und Nieren nebst Bemerkungen uber die Genese der Retinitis albuminurica.) *Arch. f. Augenheilk.*, Juni, 1909.

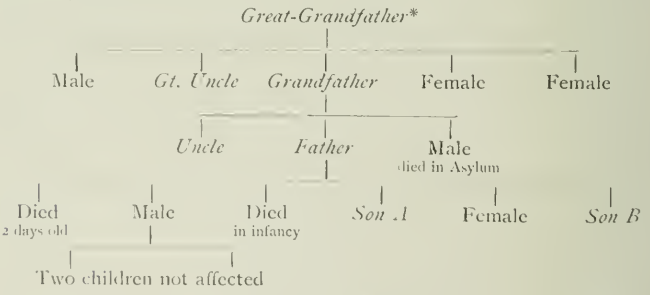
The experiments of **zur Nedden**, of Bonn, on the relationship of albuminuric retinitis to nephritis, are based on some of Sata's investigations on organ-toxins. Sata found that the emulsion of guinea-pig kidneys injected into the peritoneal cavity of a guinea-pig caused parenchymatous nephritis. To a lesser extent, it also affected the brain, liver, and red blood corpuscles. When injected into rabbits, this nephro-toxin produced similar but less severe lesions. The action of the anti-kidney serum on organs other than the kidneys, is explained by Nedden in this way.—That the serum contains at the same time antibodies for some albuminous substances in these organs. Accordingly, these substances in the brain, liver, and red blood corpuscles must present some similarity to others contained in the kidneys. Sata had examined the eyes of the animals he had experimented with, and Nedden thought it would be interesting to see whether nephro-toxin had any effect

upon the retina. This proved to be the case. When injected into the common carotid the serum causes definite changes in the retina, in the shape of greyish-white spots which become confluent, and in about six hours, cover large areas of the fundus. Examined with the microscope, the lesion is found to be confined to the innermost layers of the retina. Here the supporting fibres are forced apart and the spaces thus created are filled with a granular material which stains very badly. No other lesions occur. Chronic changes could not be produced, owing to the circumstance that the animals die in a few hours from the acute nephritis caused by the toxin. z. Nedden's paper concludes with a long defence of the hypothesis, that the substances in the retina which are attacked by the toxin are biologically, if not chemically and physically, closely allied to the substances attacked in the kidneys, and that they are for this reason picked out and destroyed by the toxin. He formulates the further hypothesis, that in cases of granular contracted kidney, in which the retinal lesions are most common, the destructive process is so great that the cytotoxins are produced to an extent which cannot be controlled by the system. These cytotoxins, therefore, attack the albuminous substances in the retina which are allied to those breaking-down in the kidneys, and thus produce the clinical picture of albuminuric retinitis. PERCIVAL J. HAY.

VI.—CONGENITAL OPHTHALMOPLEGIA.

Cooper, Henry.—A series of cases of congenital ophthalmoplegia externa (nuclear paralysis) in the same family. *British Medical Journal*, April 16th, 1910.

The family reported on by **Cooper** (R.N.) is a truly remarkable one. The original patient (son A) was seen on account of a trivial injury and was noticed to have immovable eyeballs and ptosis. Investigation brought the father of this lad on the scene, and he (similarly affected himself) stated that his father and grandfather were both born with the same affliction. From his statement the following tree was prepared. So far as he could remember: (1), no female member had been affected; (2) all the cases had been congenital; (3) ptosis had been almost complete in all the affected except his own youngest son.



*Italics indicate those affected.

ERNEST THOMSON.

OPHTHALMOLOGICAL INSTRUMENTS

MADE BY

E. B. MEYROWITZ,

LONDON, PARIS AND NEW YORK.

(1) By Dr. Percy Bardsley. The Scotometer (improved model).

(2) By Mr. J. H. Tomlinson. Spectrum Projection Lantern for Colour Perception Tests.

(3) The Maddox Tangent Scale.

The above instruments are briefly described below. Further information will be gladly given upon application or, by arrangement, they can be obtained upon trial.

(1) The Scotometer (improved model). The construction of this instrument has been somewhat modified from the original models with a view to increasing its accuracy and general convenience. The alterations which have been made lie in the method of turning the screen, and in the stand. The screen in the original pattern instrument was liable to work stiffly and in jerks, thus spoiling the accuracy of an observation by moving too far at one time, and distracting the patient's attention by the surgeon's efforts to make fine adjustments.

In the new model this defect has been overcome by arranging the movement of the screen to be performed by turning a small friction wheel mounted on springs. The milled knob actuating this is hidden behind the screen, and the great advantage of the surgeon's hands being hidden from the view of the patient, while the instrument is being manipulated, is retained. The screen can now be most delicately adjusted with less noise than before, and with greater convenience. The stand has been modified in shape, and the general finish improved by stove enamelling. Dr. Bardsley has drawn up a new chart for use with the instrument, which is sufficiently large for observations to be most accurately recorded and plotted out upon.

For observations up to 30 degrees it is certainly the most accurate and reliable instrument at the disposal of the oculist. The following are the details of the instrument: The patient gazes into the dull black section of a hollow sphere, which has a central fixation disc, and a slit for moving the test object radially. The surgeon sits behind the screen, hidden from the patient, who sees nothing in the instrument to distract his attention. The surgeon

can watch the patient's eye through a small hole in the fixation spot. Coloured fixation and movable points are provided for testing colour perception.

(2) Spectrum projection lantern for the testing of colour perception. This lantern, which was originally described in European Bulletin, Midsummer, 1909, has many unique features which make it particularly useful either for routine testing or scientific research. It enables the actual spectrum to be used as a test in place of coloured glasses, and provision is made to allow of any portion of the spectrum to be selected and used either as a monochromatic patch or in comparison with any other portion of the spectrum. The construction of the apparatus is as follows :—

An optical lantern, with a Nernst lamp as illuminant, projects a powerful beam of light through either a prism or diffraction grating according as to whether a short or long spectrum is required. The spectrum produced falls upon two long, narrow mirrors which are mounted horizontally on pivots and lay side by side, and which can be moved independently of each other. These mirrors each reflect a narrow spectrum on to two opal screens placed close together, both being provided with shutters so that any portion of either can be masked at will. By tilting the mirrors, by means of the screws provided, the spectra can be made to pass over either screen, or they may be superimposed, or a monochromatic patch can be selected by manipulating either screen, which can be used as a standard to be matched by a portion of the other spectrum : the mirror being tilted for this purpose by the patient himself. In view of the importance of the subject of tests for colour blindness, this apparatus deserves to be more widely known and used than it is at present, as it is an eminently practical instrument. Its price has recently been reduced.

(3) The Maddox tangent scale. The scale is for use at a distance of 5 meters, and consists of divisions showing the tangents of degrees at that distance. It may be used in measuring or demonstrating the angle of deviation in prisms, the reading being in prism dioptre units. All that is necessary is to hold the prism with the base to the right or left, and observe the position of the arrow. The reading is direct, thus, if the arrow indicates "3" on the scale, the prism is one of 3 dioptres.

For measuring ex- and esophoria a small light object is placed directly before the black circle on the arrow. A Maddox rod is placed before one eye and the patient reads the figure cut by the line of light.

The "Meyrowitz Bulletin," European Edition, Midsummer, 1910, is now ready, and will be forwarded to any address on application.

VII.—TRACHOMA BODIES.

(1) Dreyer, W. and Meyerhof, M.—On the occurrence of trachoma bodies in Egypt. (Ueber Befunde von Trachomkörperchen in Aegypten.) *Klin. Monatsbl. f. Augenheilkunde*, April, 1910.

(2) Heymann, Bruno.—The true position of the Prowazek bodies. (Ueber die Fundorte des Prowazek'schen Körperchen.) *Berl. Klin. Wochenschrift*, April 11, 1910, Nr. 15.

(3) Flemming.—Investigations concerning the so-called "trachoma bodies." (Untersuchungen über die sogenannten Trachomkörperchen.) *Arch. f. Augenheilk.*, April, 1910.

(4) Addario. — The pathogenic element of trachoma. *Archives of Ophthalmology*, July, 1910.

(1) **Dreyer** and **Meyerhof**, writing from the classical land of trachoma, confirm in every respect the findings of Halberstädter and Prowazek, the discoverers of the "trachoma bodies." Three kinds of conglomerations of granules are described, and, as is customary, considered to represent as many stages of development in the life-history of parasites. It would, however, in Dreyer and Meyerhof's opinion, be premature to identify the bodies with the cause of trachoma. The authors speak incidentally of the follicles as the typical pathological products of trachoma, a statement which perhaps should not be allowed to pass unchallenged. C. MARKUS. 8

(2) **Heymann**, of Breslau, has examined the conjunctiva, healthy and diseased, of 235 human beings, as well as of 25 animals (pavians, rabbits, guinea-pigs, and mice), with a view to the discovery of the bodies described by Prowazek and Halberstaedter as present in trachoma. He succeeded in finding them only in eyes affected with or suspected of trachoma, in blennorrhœa neonatorum, and in a case of conjunctivitis occurring in a puerperal woman, where there was no suspicion of trachoma. To go a little more deeply into Heymann's figures, the Prowazek bodies were found in ten out of fifteen recent cases of trachoma. Of the remaining thirty-eight cases of trachoma, the bodies were found in three out of fifteen relapses, and in not a single one of twenty-three old cases. Of the total number of cases of trachoma examined, therefore, a positive result was obtained in 14.52 per cent. and a negative result in 75.48 per cent. Of the cases of blennorrhœa neonatorum, which numbered 43 all told, 14 were gonococcal, 10 were instances of inclusion conjunctivitis (without gonococci), and 12 were examples of mixed blennorrhœa. There appeared to Heymann to be some antagonism between the virulence of the gonococcal infection, on the one hand, and the number of the Prowazek bodies, on the other. At the same time, on occasion, the bodies in question were abundant in cases where gonococci were also numerous, a conjunction of events regarded by the author as of evil omen. Heymann found in scrapings from 15 cases of gonorrhœa in males and females the bodies twice only, and these two patients, a man and a woman, were the parents of twins, both of whom suffered from ophthalmia neonatorum, associated with gonococci and Prowazek bodies. This significant discovery led the author to surmise that the same manner of infection occurred with the Prowazek bodies as with gonorrhœa. It also raised the question as to whether the bodies merely accompanied gonorrhœa or whether they were to be regarded as signs or excitants of another disease. In order to settle these questions, the conjunctiva of apes was inoculated, first with cultures of gonococci (dead and living) and with recent secretion

from eyes rich in gonococci. The inoculation was made with and without scarification of the conjunctiva. Beyond injection and secretion, there were no symptoms of blennorrhœa, no increase in gonococci, and no Prowazek bodies. But several weeks later, when the conjunctiva of one of the apes used in the first experiments was superficially scarified and then inoculated with Prowazek bodies, there resulted in seven days purulent discharge and redness and swelling of the eyelids, together with many Prowazek bodies. A second ape showed identical macroscopical and microscopical reaction after its eye had been inoculated with secretion obtained from the first animal. The conjunctiva and genital organs of a third ape, inoculated from the second ape, showed (on the fifth day) a conjunctivitis, the secretion from which included numerous Prowazek bodies. Apes were also inoculated with positive result with gonococci and cell inclusions from newly-born babies, as well as with gonococcus-free secretion from the puerperal woman. Many Prowazek bodies were found under these circumstances. The genital secretion from the two parents with Prowazek bodies, when inoculated into apes, produced conditions similar to those which followed inoculation of the conjunctival secretion from the newly-born.

At this point Heymann summarises the results in the following way :

1. Prowazek bodies were found not only in trachoma but also in non-trachomatous ophthalmia neonatorum, sometimes with and sometimes without gonococci, as well as in one case of conjunctivitis in a puerperal woman.

2. The bodies were present, with gonococci, in the genitalia of the parents of the newly-born children affected with ophthalmia.

3. The Prowazek bodies produced in apes—first, an affection resembling blennorrhœa, and, afterwards, one resembling follicular catarrh, which could be reproduced in other apes by inoculation. The result was the same whether the Prowazek bodies were obtained from the non-trachomatous conjunctiva of the children or of the puerperal woman or from the genitals of the parents.

4. In the conjunctival epithelium of apes with experimental conjunctivitis Prowazek bodies were very numerous.

5 The same inoculation results could be produced whether the genital secretions contained Prowazek bodies or not, provided that in the latter case the *anamnesis* showed that they were related to a conjunctivitis accompanied with cell inclusions.

6. Prowazek bodes were also found in the epithelium of the vagina of a couple of apes whose genitalia had been inoculated—the first with ocular secretion containing cell inclosures, and the second with vaginal secretion, devoid of cell inclosures.

Heymann appears to believe that the Prowazek bodies go to prove the existence of an unknown virus, capable of transmission to apes. The conjunctiva of newly-born babies is particularly sensitive to this virus. It is possible that it may affect the eyes or the genito-urinary apparatus or the other organs of adults. He suggests that it might be well to search for the Prowazek bodies in other affections, especially in the non-gonococcal ophthalmia of puerperal women, described by Kruckmann, in congenital suppuration of the lacrymal sac in infants, in rhinitis neonatorum, in granular colpitis, and so forth.

In conclusion, Heyman restates, as follows, the main questions that centre around the Prowazek bodies :—

1. Is the virus of trachoma identical with that from non-trachomatous discharge from the eyes and genitals?

2. Is the virus pathogenic for the uro-genital organs and capable of spreading from them?

3. Is it possible to transmit the inclosure-free trachoma virus to apes?

SYDNEY STEPHENSON.

(3) **Flemming's** report on "trachoma bodies" covers investigations extending over a period of nine months, during which the writer examined some 300 cases and 2,000 slides while travelling in Posen, Zuin, and Hungary, and in Berlin. Peculiar, well-characterised bodies were found in the epithelial cells of the conjunctiva in cases of trachoma, and, more frequently still, in ophthalmia neonatorum, also in gonorrhœal forms, and even in a case of gonorrhœal ophthalmia occurring in an adult. They could not be distinguished from each other in the different diseases. They could be stained with all the known methods of staining and could also be demonstrated with the Indian ink method. Man and apes could be inoculated with them. Seven to nine days were necessary before they appeared in greater numbers. They were found only in cells showing pathological changes, and were often seen together with other known organisms causing conjunctivitis. The effect upon them of the treatment for trachoma and blennorrhœa varied very much. In some cases they disappeared immediately; in others they appeared only when the clinical symptoms began to improve and then disappeared when the mucous membrane became healthy. Flemming is of opinion that these bodies do not cause the diseases mentioned, nor does he look upon them as degeneration products. They are probably "micro-organisms which occur as parasites in various desquamating catarrhal inflammations of mucous membranes."

PERCIVAL J. HAY.

(4) **Addario** has found formations similar to Prowazek's bodies in forms of conjunctivitis other than trachoma, and also in the normal conjunctiva. These, he considers, are normal and of no pathogenic value. He has also studied the blastomycetæ of trachoma in six cases of pannus crassus, and has seen blastomycetæ with an enormously thick capsule with concentric layers.

ROSA FORD.

VIII.—CATARACT PRODUCED BY ELECTRIC CURRENT.

(1) **Komoto, J.—Cataract produced by electric shock.** (**Kataraktbildung nach elektrischem Schlag.**) *Klin. Monatsbl. f. Augenheilkunde*, Februar, 1910.

(2) **Dalén, A.—A clinical contribution on cataract formation after electric discharges.** (**Zur Kasuistik der Kataraktbildung nach electrischer Entladung.**) *Mitteilungen aus der Augenklinik der Carolinischen Medico-chirurgischen Instituts zu Stockholm*, 1910.

(1) The first of **Komoto's** two patients was a man, aged 48 years, who received an electric shock by his right cornea coming in contact with a charged copper wire. This was followed by loss of consciousness of half an hour's duration, and by inflammation and irritability of the right eye. Komoto saw the patient the first time five months after the accident, when he found a faint corneal opacity and an extensive and thick anterior capsular cataract of irregular but sharp outline. Subsequently, the whole lens became opaque, and the cataract, on reaching maturity, was successfully removed.

The second case was that of a man, aged 28, whose hand and forehead were burnt by an electric current of 11,000 volts. A prolonged period of unconsciousness followed, and the sight of the left eye began to diminish six months, that of the right eye one year, later. Komoto found, two years after the accident, a

ripe cataract in the left, and an incomplete cataract in the right eye. In both eyes the anterior capsule showed a great number of grayish-white dots; the operation for cataract was successful in both eyes. C. MARKUS.

(2) **Dalén** (Lund) describes a case of his own where after receiving a short circuit discharge from a wire carrying a potential of 21,000 volts, a workman developed double cataract. The nature of the opacity is shown by two illustrations. Both lens were successfully extracted. The author then refers to other published cases, and notes that in all the discharge had been received by the head of the patient. The opacity of the lens is not caused by the blinding flash of a short circuit; for in many of the recorded cases the shock was due to direct contact, without any light phenomena.

T. HARRISON BUTLER.

IX.—CONJUNCTIVAL FLAPS IN OPHTHALMIC SURGERY

Byers, W. Gordon.—Conjunctival flaps in ophthalmic surgery. *Ophthalmic Record*, July, 1910.

The employment of flaps of conjunctiva to cover wounds in the coats of the eye was advocated by Schoeler as long ago as 1877, and Kuhnt has published independently several valuable contributions upon the subject. Nevertheless, the procedure has not even yet received its due recognition either in this country or in America.

The present communication by **Byers**, of Montreal, emphasizes anew the value of the contributions of Schoeler and Kuhnt, and describes some modifications that Byers has himself made in the methods of operation.

The danger of intra-ocular infection in perforating wounds of the cornea and sclera is heightened by several factors, the more important of which are: (1) the micro-organisms always present, even in the normal conjunctival sac; (2) the presence of inflammation of the conjunctiva or of the lacrymal passages; (3) the density and poor vascular supply of the cornea and sclera; and (4) the danger of the vitreous humour being brought into direct contact with the outside infective agencies, as by its prolapse through a wound, accidental or operative. Tags of vitreous, as Byers remarks, may sometimes "remain as fuses leading to the inflammable mass within." In the ocular conjunctiva we possess a most valuable agent for combating these several dangers. That tissue is richly vascular, can supply agglutinating lymph, can furnish material that aids in the repair of tissue with which it is brought into contact, and, lastly, can bring upon the scene of action an army of protective leucocytes.

Byers believes that in the light afforded by modern bacteriological knowledge it is no longer justifiable to "needle" through corneal tissue, although such a procedure is still recommended in some of the modern text-books. On the contrary, the instrument should be entered a few millimeters from the sclero-corneal margin, and be passed for that distance beneath the conjunctiva, to enter the anterior chamber through the ring of sclerotic forming its boundary. In capsulotomies, the author first makes a small conjunctival flap with scissors, then performs the operation itself, and, finally, seals the wound by covering it with the flap cut in the first instance. By these means he endeavours to avoid the infection of any shreds of vitreous which may have escaped from the anterior chamber. He refers to the usefulness of a conjunctival flap in the operation for the extraction of senile cataract, now usually adopted since attention was directed to the point by the late Professor Snellen at the Edinburgh Congress in the year 1884.

In removing foreign bodies from the eye by means of the electro-magnet, Byers extracts from the anterior chamber if the body lies in front of the iris and ciliary body, and if behind, through the sclera. In the latter event, he makes a conjunctival flap before incising the sclera. In Mules's operation, again, he follows the plan devised by the late Frank Buller, and before incising the eyeball, first raises the conjunctiva well back towards the equator. After eviscerating the eyeball and inserting the glass ball, he brings together the edges of the scleral opening in a vertical direction by fine silk sutures, intended to remain *in situ*, and afterwards sutures the conjunctival opening in a horizontal direction. By these means not only is the wound strengthened, but the possibilities of the infection of the scleral sutures is entirely excluded.

Dealing with scleral wounds, Byers was led by an unfortunate experience to place the edges of the covering conjunctival flaps, together with their sutures, at a safe distance from the scleral aperture, so as to avoid the chances of infection entering the globe along the track of the conjunctival sutures. The method he adopts is perhaps best described in the author's own words:—

"A young lad was injured by a stone while at play on the afternoon of September 2nd, 1902. On examining the right eye, I found a horizontal wound, which extended from a few millimetres in front of the corneo-scleral margin to a point about one centimetre behind the limbus. Vitreous was presenting, the pupil was irregular from iridodialysis of its outer periphery, and there was a small hyphæma in the anterior chamber. Under cocaine, I cut away the vitreous and prepared my flaps in the following manner; the upper one I dissected up so freely from the sclerotic that it readily lent itself to considerable stretching and displacement, while from the lower one I merely cut away a portion of its upper border. On bringing the edges of these flaps together, I had a conjunctival wound, the suture line of which extended somewhat obliquely but well below the scleral aperture. It is virtually impossible to have contamination from the conjunctival sac under these circumstances, and the case made a perfect recovery with 6/5 vision."

SYDNEY STEPHENSON.

X.—ORBITAL CELLULITIS FOLLOWING IRRIGATION OF THE LACRYMAL SAC.

Lamm, G.—Orbital thrombophlebitis following irrigation of the lacrymal sac. (Thrombophlebitis Orbitæ nach Spülung des Tränensackes.) *Mitteilungen aus der Augenklinik des Carolinischen Medico-chirurgischen Instituts zu Stockholm*, 1910.

Lamm (Helsingborg) recounts a case in which orbital phlegmon, ending in complete loss of vision, complicated his treatment of an obstructed lacrymal canal. There was some difficulty in the *lavage*; the fluid did not pass into the nose, but returned by the upper canaliculus. On the second occasion upon which the sac was washed out, a small swelling appeared under the lower lid—the sac had obviously ruptured. Two days later, there was severe œdema of both lids, with chemosis and proptosis. Vision was reduced to bare perception of light, and there was optic neuritis, obstruction of the central artery, and retinal hæmorrhages. These severe symptoms soon disappeared, but the nerve became atrophic, and total blindness ensued. A small Lüer's syringe was employed. The author finds very few allusions to this accident in the text-books, and he has traced only nine cases in the literature published on the subject.

We can unfortunately add two more, of which one occurred in our own practice, the second in that of a friend. Both were examples of trachomatous affection of the sac. The trachomatous sac ruptures under very slight pressure; so easily, indeed, that *lavage* in the presence of trachoma is a most dangerous procedure. All trachomatous sacs should be extirpated.

T. HARRISON BUTLER.

XI.—OPTIC NEURITIS.

(1) Hird, R. Beatson.—Optic neuritis in relation to intra-cranial growth and its treatment. *Birmingham Medical Review*, April, 1910.

(2) Ley, Leonard.—The inequality of the Papillœdema in certain cases of increased intracranial pressure. *British Medical Journal*, April 16th, 1910.

(1) **Hird**, of Birmingham, read a paper on the burning subject of optic-neuritis in relation to intra-cranial growths before the University Medical Society recently, and this is now printed in the *Birmingham Medical Review*. After some preliminary remarks of an elementary nature dealing with the normal anatomy of the optic disc, Hird passes forward to discuss the theories of the causation of optic neuritis, and, in doing so, expresses his personal preference for the mechanical hypothesis of Schmidt-Manz. It is supported, as he points out, by the absence of the pathological signs of neuritis, and particularly by the fact that neuritis subsides and sight improves as soon as the increased intra-cranial pressure is reduced by operation. The appearance of neuritis first, followed by loss of vision later on, is regarded by Hird as a point in favour of the condition being an œdema in the early stages, the fibres being compressed and atrophy setting in as a consequence. The amount of pressure cannot be estimated by the appearance of the optic disc. Temporary losses of vision in intra-cranial growths, without ophthalmoscopic signs, may occur from pressure of the distended third ventricle upon the chiasma, and be an important sign before the onset of optic neuritis. Much may be learned from an examination of the field of vision. If atrophy be present, the field is more or less concentrically contracted or may manifest irregular notching or receding angles. The field is usually contracted below at first. The dyschromatopsia, recently described by Bordley and Cushing, is mentioned, and the figures given by those authors are adduced. Hird thinks that intracranial pressure should be relieved before there is any loss of visual acuity.

With regard to the significance of optic neuritis, that condition occurs in about 80 per cent. of all cases of intra-cranial tumour (Gowers, Paton), and it may be caused irrespective of the dimensions or the situation of the neoplasm. It may be the sole definite sign of organic intra-cranial disease. The development of optic neuritis invariably indicates progress in the morbid growth. On the other hand, its regression indicates subsidence of the growth. A cerebral tumour may cause symptoms for years before optic neuritis makes its appearance, and Gowers states that in cases like this death is apt soon to follow.

Paton is quoted as saying that "the nature of a growth influences optic neuritis only so far as it determines the position of the growth." If the growth of a neoplasm is rapid, optic neuritis usually sets in early. No trustworthy information as to the size of a neoplasm can be gained from the neuritis. Valuable evidence with respect to the site of an intra-cranial growth may be obtained from the presence or absence of optic neuritis. Intense optic neuritis, often with complete loss of sight, is present in 89 per cent. of the cases of cerebellar tumours (Martin). In 41 instances of cerebellar tumour, Paton found optic neuritis to be present in all. Growths of the medulla are so rapidly fatal that there is scarcely time for

neuritis to develop. Neuritis is usually present in pontine tumours. In growths of the temporo-sphenoidal region, the optic thalamus and mid-brain, or of the corpora quadrigemina, optic neuritis, as a rule, is present, and is intense in those of the region first-named. We conclude, then, that optic neuritis is most frequent in cerebellar and cortical tumours; less frequent in such cortical and pontine growths, and when present, is due to spread to the basal nuclei and cerebellum respectively. Neuritis is absent from about one-half of the tumours affecting the pons, and absent from most of those affecting the medulla. The so-called "fan figure" is commonest in cerebellar tumours.

As to the ipsolaterality or otherwise of the neuritis, the conflicting opinions with regard to this point of Taylor, Gunn, J. A. Martin, Gowers, Horsley, and Paton are quoted. The experimental work of Leonard Hill and Henderson has shown that the viscous mass of the brain is divided by the falx cerebri and tentorium cerebelli, with the consequence that the pressure on one side can rise above that of the other, although normally they are equal. This is regarded by Hird as a point in support of the homolateral theory. Hird believes that if there be no localising signs as to the position of the growth, it is well to regard it as located upon that side on which the neuritis is most severe.

After some remarks dealing with the surgical treatment of the cases, Hird concludes a most practical communication by emphasising the following points:—

(1) The type of optic neuritis met with in intra-cranial growth is especially characterised by swelling, and has a typical appearance.

(2) In all cases where intra-cranial disease is suspected, the discs should be examined and the fields taken.

(3) In comparing the neuritis of one side with that of the other, the age must be considered as well as the swelling.

(4) If this is done, much reliance can be placed on the homolateral theory.

(5) There is no doubt that the neuritis is dependent on increased intra-cranial pressure.

(6) Operative interference should take place therefore early before vision is affected. SYDNEY STEPHENSON.

(2) **Lee**, of Great Yarmouth, offers an ingenious explanation of the inequality of papilloedema in the two eyes. He holds that the brain is a viscous fluid and exerts equal pressure on all parts of its surrounding cases. The pressure in the two optic nerve sheaths is therefore the same. Now the eye is also surrounded by an unyielding membrane, but there is a weak spot at the optic nerve entrance. The central pressure exerts itself equally on each papilla and the result of that pressure will depend upon the filtration processes in the eye. If these are normal in both eyes, then the swelling of the papilla can go on unchecked and will be the same in both eyes; but if there be the least difference in the intra-ocular tension of the two eyes, the papillary swelling will not be so great in the eye having the higher tension. The author assumes that slight and "quite unappreciable" degrees of tension might materially hinder the swelling of the disc. ERNEST THOMPSON.

XII.—BUPHTHALMOS.

Mayou, M. S.—A case of congenital anterior synechiæ with buphthalmos (anterior staphyloma). *Transactions Ophthalmological Society U.K.*, Vol. 30, Fas. 2, p. 120.

Mayou, of London, records a very interesting and important case in which, apparently owing to non-separation of the mesoblast of the iris and pupillary membrane from the cornea, an anterior adhesion of the iris, practically all round the pupillary margin, remained and gave rise to a secondary glaucomatous condition. The cornea, with the iris pressed closely against its posterior surface, was greatly distended, giving rise to the condition which Mayou calls buphthalmos (the correctness of which, as Parsons pointed out, is open to some doubt). An interesting feature of the case was the adhesion of some of the ciliary processes to the posterior surface of the lens, and some discussion was provoked on this matter in regard to the origin of the fibres of the ligament of the lens. Another point was the interesting defect in the posterior surface of the lens itself. There was a gap in this structure, filled in with fibrous tissues of vitreous origin apparently, as it was connected with a persistent hyaloid artery. Mayou regarded the defect as due to the rupture of the posterior capsule by the traction on the adherent ciliary processes, but we are inclined to agree with Collins, who regarded this as a developmental defect. It is probable that a section of the lens itself would help to clear up this point conclusively, as it would show the position of the cells which, in an early stage of fœtal life, are invaginated from the posterior surface and pressed forwards, leaving a cup-shaped depression in the posterior surface of the lens. The last point of special interest in the case was the developmental fault in the retina, the ganglion cells and the bacillary layer being highly defective. This was of great interest in connection with the fact that the other eye was affected by nystagmus and was possibly amblyopic

The case was discussed by Collins, Parsons, and Coats.

Mayou, in replying, said that he adhered to his view as to the rupture of the posterior surface of the lens, as the capsule was formed very early indeed. Whilst this is so far true of the anterior part of the capsule, we venture to think that it is not equally true of the posterior part, which is of much later formation than is the anterior.

The case forms a very interesting and helpful complement to the reading of the pathogenesis of congenital anterior staphyloma.

LESLIE BUCHANAN.

XIII.—EYE AFFECTIONS IN PLAGUE.

Mizno.—On eye affections in plague. (Ueber die Augenveränderungen bei Pest.) *Arch. f. Augenheilk.*, Bd. LXV, November, 1909, p. 1-41. illustrated.

Mizno (Osoka), finds, that the *facies pestica* is not a typical symptom of plague, but that hyperæmia of the conjunctiva is one of the most important symptoms of this disease. The bacilli may spread from the conjunctiva and cause a general infection, with or without other eye symptoms. The primary affection of the eye is generally a typical conjunctivitis, occasionally an acute dacryocystitis. The former is very much like a blennorrhœa, but the secretion

is very slight, and the discharge watery and stained brown, owing to hæmorrhages into the conjunctival sac. The discharge swarms with the specific organism. As a rule, the preauricular glands, the parotid, and submaxillary glands are also involved soon after the conjunctiva. Microscopic sections show that the bacilli are present chiefly in the reticulate layer of the conjunctiva, where they are found in enormous numbers. They develop particularly along the lymphatics. Eye complications are fairly common (4·3 per cent.). They generally begin on the fourth day. In 34·6 per cent. of the cases both eyes are affected, and the prognosis in these circumstances is very much worse. The ophthalmic complications met with are panophthalmitis and keratitis, ring-abscess, corneal ulcer, iritis, and conjunctivitis. The seat of the primary infection does not seem to have any bearing upon the frequency of eye complications. Infection is spread chiefly by the blood-vessels. The organisms grow and multiply rapidly in the eye, especially in the aqueous humour. They do not grow very well in the uveal tract, and the hyaloid membrane acts as a filter. P. J Hay.

XIV.—INSTRUMENTS AND APPLIANCES.

(1) James, G. T Brooksbank.—On the measurement of the stereoscopic visual acuity. *Lancet*, June 20th, 1908.

(2) Bouchart.—A retractor for chalazion operations by the external method. [Ecarteur à Chalazion (opération par voie externe).] *L'Ophtalmologie Provinciale*, T. V., p. 187, décembre, 1908.

(3) Elliot, Major R. H.—Exhibit of three instruments (a) an optic nerve hook for use in the operation of optico-ciliary neurectomy; (b) an evisceration spoon; (c) an elevator for use in extirpation of the lacrymal sac. *Transactions Ophthalmological Society U.K.*, Vol. XXIX, 3rd Fasc., 1909.

(4) Harman, N. Bishop.—The diaphragm test for binocular vision and its disorders. *British Medical Journal*, October 2nd, 1909.

(5) Tomlinson, J. H.—A scotomagraph with binocular fixation. *British Medical Journal*, October 2nd, 1909.

(6) Green, John.—Coquille protective spectacles. *American Journal of Ophthalmology*, November, 1909.

(7) Pichler.—A transparent pocket test of visual acuity. (Eine durchleuchtbare Taschensehprobe.) *Zeitschrift für Augenheilkunde*, Juni, 1909.

(7A) Polack, A.—Rémy's diploscope. (Sur le diploscope de Rémy.) *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1908 (volume published in 1909, p. 277).

(8) Berger, E.—Cards to be used with a stereoscope for the determination of the central visual acuity of deficient eyes. (Tafeln zur Bistimmung der Centralen Sehschärfe schwachsichtiger Augen mit Hilfe des Stereoskops.) *Centralbl. f. prak. Augenheilk.*, Januar, 1910.

(9) Whitney, W. Norton.—Modified Knapp roller for expression in trachoma. *Annals of Ophthalmology*, January, 1910.

(9A) Claiborne, J. Herbert.—A pocket ophthalmoscope. *Ophthalmology*, January, 1910.

(9B) Cooke, Clinton T.—A new skiascope. *Ophthalmology*, January, 1910.

(10) Gaupillat.—Notched frames of cylindrical glasses shorten the investigation of refraction. (Les entourages à crans des verres cylindriques abrègent la recherche des verres.) *La Clinique Ophtalmologique*, 10 février, 1910.

(11) Tomlinson, J. H.—A spud for impacted foreign bodies. *Transactions Ophthalmological Society* U.K., Vol. XXX, Fasc. 2, 1910.

(12) Edridge-Green, F. W.—A new form of lantern for testing colour perception. *Transactions Ophthalmological Society* U.K., Vol. XXX, Fasc. 2, 1910.

(13) Tomlinson, J. H.—A scotomagraph with stereoscopic fixation. *Transactions Ophthalmological Society* U.K., Vol. XXX, Fasc. 2, 1910.

(14) Rhoades, J. N.—A way to remove all the aberrations from frameless glasses. *Ophthalmology*, April, 1910.

(15) Tooke, Frederick.—A new forceps for the removal of the anterior lens capsule. *Montreal Medical Journal*, June, 1910.

(16) Byers, W. Gordon.—Coloured toric glass for use in examining cases of ocular paralysis. *Montreal Medical Journal*, July, 1910, and *Ophthalmic Record*, July, 1910.

(17) Gertz, H.—A new keratoscope. (Ein Neues Keratoskop.) *Mitteilungen aus der Augenklinik de Carolinischen Instituts zu Stockholm*, 1910.

(1) It is practically impossible to make an abstract of **James'** paper, in which he describes a simple apparatus for the measurement of stereoscopic visual acuity. Fortunately, it is published in a readily accessible journal.

(2) **Bouchart** has devised a retractor for keeping the edges of the incision separated when removing chalazia through the skin. It resembles a lid speculum of the safety-pin pattern with small solid plaquets.

(5) **Tomlinson's** instrument can be used for general perimetry or for accurately mapping out blind or anæsthetic areas. The test object used to prove the sensitiveness of the retina is a second image of the spot used as the fixation point. This second image is obtained by reflection from a mirror hinged within a cone, the angle of the mirror determining the angular position of the second image on the retina. The cone can be rotated round its axis, so that the second image is caused to make a circular excursion on the retina; in this way Bjerrum's method of investigation can be employed. An automatic registration is obtained by means of a needle which is carried by the mirror and extruded pneumatically by mechanism similar to that used for operating a photographic shutter. The second eye looks down a tube at a small spot the same size as the spot looked at by the eye under examination; the brain interprets this as the same spot, and stereoscopic fixation is thus obtained.

(6) **Green's** article is a mathematical demonstration of the coquille lens of zero power.

(7) **Pilcher** (Prague) very rightly observes that in a private house it is often difficult efficiently to illuminate test types. He has therefore had v. Ammon's types made on thin celluloid, so that they can easily be illuminated by a candle placed behind them. T. HARRISON BUTLER.

(7A) **Polack** (Paris).—The diploscope has been described so recently in THE OPHTHALMOSCOPE that it is hardly necessary to abstract this paper, which first describes and then studies the instrument. T. HARRISON BUTLER.

(8) **Berger** has designed some cards for the determination of visual acuity in damaged eyes for Workmen's Compensation Act purposes. They are so arranged that viewed through a stereoscope, a checker board appearance results and the squares are made in varying sizes for the different degrees of acuity. A dot over one square is used for fixation point of the good eye and the patient has to tell what he sees. A. LEVY.

Modified Knapp Roller.

(9) The modification of Knapp's forceps by **Whitney**, of Tokyo, Japan, is shown in the figure. It is made in America by E. B. Meyrowitz, of 104, East Twenty-third Street, New York City.

(9A) **Claiborne's** instrument resembles a Loring ophthalmoscope in which the screw-on handle is replaced by a flat metal disc, lined with felt and attached by a hinge with a snap catch. When it is being carried in the pocket, the instrument is folded in the middle, the disc acting as a cover to protect the mirror. A. J. BALLANTYNE.

(9B) This skiascope consists of what is practically a large Morton ophthalmoscope, with lenses two centimetres in diameter, fixed on the end of a long arm which is supported by a stand. At the operator's hand there is a wheel by which he he changes the lenses and a disc which indicates the lens which is in position. A. J. BALLANTYNE.

(11) **Tomlinson's** instrument has a small triangular flange carried at right angles to the stem of the instrument. The apex has cutting edges, so that it can be passed beneath the foreign body. ERNEST THOMSON.

(13) **Tomlinson's** ingenious instrument has been already mentioned in the account of the London Ophthalmic Exhibition which was given in THE OPHTHALMOSCOPE for April, 1910.

(14) The trouble that **Rhoades** aims at overcoming is chiefly the annoying reflection of light into the eye of the wearer from the edges of rimless glasses, and from the bright metal rims of the other patterns. To obviate the former, he would bevel the edges of the lenses so that if their surfaces were prolonged backwards, they would meet at a point on the retina. Reflections from the metal rims can be prevented by blackening them. In the case of gold rims, this can be done by first silvering and then oxidising them.
A. J. BALLANTYNE.

(15) After alluding to the various plans of dealing with the anterior capsule in the operation of extracting cataract, **Tooke**, of Montreal, advocates the

employment of capsule forceps for the purpose. His instrument (shown in the figure) has blades curved in a concave way in accordance with measurements taken of the human lens. At toe and heel of the two blades there are

a couple of sets of tiny interlocking teeth, which allow of the surgeon obtaining a secure grasp of the underlying capsule. The instrument is made by the Messrs. Hardy Company, of Chicago. SYDNEY STEPHENSON.

(16) **Byers**, of Montreal, suggests for use in examining cases of diplopia, instead of the ordinary red glass from the trial frame, a large, perfectly-ground, toric lens of rich red colour, supplied with a convenient handle. The wider colour field afforded by the new lens does away almost wholly with the difficulty formerly experienced in examining cases of ocular paralysis.

SYDNEY STEPHENSON.

(17) Placido's well-known disc has a definite, if somewhat limited, sphere of usefulness in the armamentarium of the ophthalmologist. It often gives valuable information about the shape of the cornea, but its indications are qualitative rather than quantitative. The human eye is not sufficiently sensitive to appreciate the slight departure from the true circular form caused by low-grade astigmatism, still less to measure its amount. **Gertz** has tried to render the instrument more sensitive and to calibrate it for quantitative estimations. He first renders the distortion more evident by using oval discs instead of circles; and, secondly, attains the same object by permitting the disc to revolve. His oval discs, which are furnished with a single white elliptical band instead of Placido's circles, are attached to the end of a tube which is furnished with a magnifying eye-piece. They can be rotated easily with the finger, and a graduated arc allows the degrees of rotation to be read off. The patient's eye is observed through the tube, and the two points noticed where the reflected oval band is most eliptical and more nearly approaches the circular form. These points give the angles at which the meridians are inclined. Then, a guess is made of the amount of the distortion, and from this, with a little practice, the degree of astigmatism can be fairly accurately determined. Four discs are supplied with the apparatus, each a little more eliptical than the last. For slight astigmatism, a more circular disc is used, the strongly oval being reserved for high grades of astigmatism.

The inventor states that it is possible with this instrument to obtain a very accurate knowledge of the form of the cornea, and it is much cheaper and more convenient than the ordinary ophthalmometer.

T. HARRISON BUTLER.

XV.—ÆTIOLOGY OF IRITIS.

(1) Jennings, Charles W. and Hill, Emory.—**Etiology of Iritis.** *Ophthalmology*, October, 1909.

(2) Campbell, Kenneth.—**Etiology of Iritis.** *British Medical Journal*, July 23rd, 1910.

(3) Worth, Claud.—**Etiology of Iritis.** *British Medical Journal*, August 13th, 1910.

(4) Butler, T. Harrison.—**The Etiology of Iritis,** *British Medical Journal*, August 27th, 1910.

(5) Campbell, Kenneth.—**The Etiology of Iritis,** *British Medical Journal*, August 27th, 1910.

(1) This paper is an analysis of the records of 500 consecutive cases of non-traumatic iritis, occurring in the Wills Eye Hospital, Philadelphia.

Its chief interest lies in the enumeration of the constitutional conditions supposed to have been the cause of the disease, and the relative frequency of their occurrence, as brought out by the statistics. Thus, we learn that syphilis accounted for 307, or 61·4 per cent., of the cases; rheumatism, 25·4 per cent.; and gonorrhœa, 5·2 per cent. These three causes between them, then, account for 92 per cent. of the cases, the other 8 per cent. being attributed to fourteen different causes, which include tuberculosis, diabetes, and acute infections.

Each group is discussed in detail, and interesting points of comparison are brought out. For the statistical details the original paper should be consulted.

A. J. Ballantyne.

(2) **Campbell**, of London, gives the following as causes of iritis according to his own observations:—

Syphilis	70 per cent.
Gonorrhœa	20 ,,
Oro-alimentary, uterine, and tubal infection ...	9 ,,
Tuberculous	1 ,,

Sydney Stephenson.

(3) As regards private patients as distinguished from hospital patients, **Worth**, of London, finds that in less than 30 per cent. is there any reason for suspecting that syphilis is the cause of irido-cyclitis. In considerably more than one-half of Worth's cases the cause has been septic intoxication, as from constipation, indigestion, decayed teeth, and so forth.

Sydney Stephenson.

(4) **Butler**, of Coventry, joins issue with Campbell for stating that bilateral iritis is always syphilitic in nature, while gonorrhœal iritis is frequently bilateral. He agrees with Worth in thinking that at least 50 per cent. of the cases are due to septic intoxications, and he feels convinced that tuberculo-toxæmia plays an unsuspected part in the causation of many cases of irido-cyclitis. He suggests that "autotoxæmic" would be a better term than "rheumatic."

Sydney Stephenson.

(5) **Campbell**, of London, agrees with Worth in thinking that in private practice syphilis as a cause of iritis is rare. He is quite unconvinced by Worth's statements concerning constipation, indigestion, etc.

Sydney Stephenson.

XVI.—EYELASHES IN THE ANTERIOR CHAMBER.

(1) **Pike, J. B.—Eyelash as a foreign body in the anterior chamber.** *Lancet*, December 4, 1909.

(2) **Paderstein.—Cilia in the anterior chamber. (Cilien in der vorderen Augenkammer.)** *Centralbl. f. prak. Augenheilk.*, Januar, 1910.

(2) **Paderstein** recognizes that cilia in the anterior chamber are, as a rule, harmless. They very seldom produce infection. In fact, the number of cases published in which infection of the eye resulted from the traumatic implantation of an eyelash is very small. A larger number have produced epithelioid tumours or cysts—probably not directly but by the simultaneous introduction of skin or gland tissue—and others, again, after remaining quiet for years, may suddenly, and without obvious cause, give rise to signs of irritation.

Paderstein cites a case of a man who received a perforating wound of the eye near the inner margin of the cornea into which a small bit of iris prolapsed, and corresponding to it a small wound in the lens capsule with

a localized opacity and stretching from the anterior synechia across the pupil was an eyelash. The eye, which was considerably irritated, was treated with atropine, etc., for five weeks, and an attempt was then made to remove the lash. This proved to be somewhat difficult, but eventually it was withdrawn by means of a blunt iris hook. The wound healed perfectly and the eye became quiet, when suddenly, four weeks later, a second eyelash became visible in the upper part of the anterior chamber, and an attempt was made to remove this also. During the operation bleeding from the iris occurred and the cilium disappeared, and it was thought possible that it had been washed out with the flow of aqueous, when suddenly, three weeks after the above operation, it again appeared in its old situation. As to where this eyelash resided during its two disappearances, it is impossible to say ; but probably in the posterior chamber. No further treatment was undertaken, and unless compelled by symptoms, no further attempt at removal will be undertaken. A. Levy.

XVII.—INTRA-CAPSULAR EXTRACTION OF CATARACT.

(1) Lister, Capt. A. E. J.—The after-effects of the escape of the vitreous during the operation of extraction of cataract in the capsule by Smith's operation. *Archives of Ophthalmology*, January, 1910.

(2) Clark, C. F.—121 cases of extraction of cataract in the capsule by the method of Major Henry Smith, of Jullundur, India. *Archives of Ophthalmology*, January, 1910.

(3) Elschnig, A.—On extraction of cataract within the capsule. *Ophthalmology*, April, 1910.

(4) Greene, D. W.—Correspondence on expression of cataract in the capsule. *Ophthalmology*, April, 1910.

(5) Wright, John W.—The removal of the cataractous lens within its capsule. *Ophthalmology*, April, 1910.

(6) Kilkelly, P. P., Major I. M. S.—Lieut.-Colonel Smith's Operations in Bombay. *Indian Medical Gazette*, XLV, 178 (May, 1910).

(1) **Lister** examined 98 eyes from which the lens had been removed in the capsule and vitreous had escaped, at periods varying from six months to nine years (average 3·7 years) afterwards. Among all these cases, of which full details are given, no detachment of retina was found ; disease of the fundus was seen in eight, in only three of which was it possible that the operation might have been to blame. Of 61 of the cases with no opacity of the cornea, no capsule and no fundus disease, only five saw less than $\frac{6}{6}$ and many saw better up to $\frac{6}{3}$. In the five cases in which most vitreous was lost, the visions were $\frac{6}{9}$, $\frac{6}{6}$, $\frac{6}{6}$, $\frac{6}{5}$, $\frac{6}{9}$, and in other six, with less loss, the visions were just about the same. Lister concludes that though, on discharge, many cases with much loss of vitreous see badly, these recover more completely than would have been expected. At first he did a retinoscopy on each patient, but he found so constantly that the astigmatism was only 1D. that he later discontinued this. In another series of cases without loss of vitreous, he also found only 1D. of astigmatism. Rosa Ford.

(2) **Clark** gives a clear and detailed description of Major Smith's method of extracting the lens in its capsule, gathered from his own observations during a stay of 23 days in Jullundur, in which time he saw the

operation performed 124 times and operated himself, under Major Smith's supervision, 121 times. He is convinced of the great value of the method, but insists on the absolute necessity of mastering Major Smith's *technique* in every detail. Major Smith's success does not depend on the peculiarities of his patients. The operation is not suitable to patients under 30 years of age. Ruptured capsule is one of the accidents to be reckoned with, but it can *generally* be avoided. ROSA FORD.

(3) **Elschnig**, of Prague, gives his opinion of Lieut.-Col. Smith's operation based on an experience of over 60 cases. At the outset he expresses disapproval of intracapsular extraction without iridectomy, as it gives prolapse of the iris within 24 hours in at least 35 per cent. of the cases. As he found that in some eyes the expression could not be carried out without loss of vitreous, he formulated for himself the rule, to continue the expression only when the edge of the lens appears in the wound upon light pressure. Sometimes the superior edge of the lens presents first, sometimes the inferior, and the operator cannot produce the one or the other result at will. In his opinion, eyes operated upon by this method heal more slowly, are more apt to show inflammatory reaction, have more small superficial peripheral corneal infiltrates than, and suffer from choroidal detachment at least ten times as frequently as those operated on by extraction with capsulotomy. He believes that prolapse of vitreous during expression of cataract is due in most cases to adhesion of the lens to the fossa patellaris. This is an individual peculiarity, and cannot be foreseen. He conceives it possible that Lieut.-Col Smith's good results may be due to a racial characteristic of minimal adherence of the lens to the fossa patellaris.

Elschnig sums up his criticism of the operation by stating his conviction that it is an exceptional procedure from which the operator will derive more pleasure than the patient. "The careful operator will . . . desist upon the slightest difficulty and proceed with the extraction with capsulotomy."

A. J. BALLANTYNE.

(4) This is a letter from Jullundur, in which **Greene**, of Dayton, Ohio, seeks to disabuse Würdemann's mind of some misconceptions regarding Smith's operation. Greene shows himself a whole-hearted and enthusiastic 'Smith man.' His letter contains a good deal of detail regarding the *technique* of the delivery of the lens under different conditions. A. J. BALLANTYNE.

(5) In this interesting communication **Wright**, of Columbus, Ohio, tells how, having on three occasions experienced the escape of the lens in its capsule when an extraction with capsulotomy had been intended, he undertook the expression of the lens in its capsule in all cases in which he thought it could be carried out with safety. His operation was described as far back as the year 1884, in the *Columbus Medical Journal*. The incision is a linear one. Puncture and counterpuncture are made at the corneal border at the junction of the upper and middle thirds of the cornea, the knife being made to cut out in a plane at an angle of forty-five degrees with the plane of the iris. Iridectomy is usually omitted. The upper segment of the cornea is depressed with the finger, and this may be sufficient to cause the lens to present. If it does not, slight pressure is made at the lower corneo-scleral border with a finger of the other hand. If this does not cause the lens to present, capsulotomy is performed. Neither speculum, fixation forceps, nor curettes are used. The author has kept no detailed record of his cases, but he believes that of about 800 or 900 cases one-third have allowed the expression of the lens within its capsule, a proportion which might have been larger had he not been afraid of causing escape of vitreous by excessive pressure. He claims for his operation that it involves the smallest possible incision that will allow the passage of the lens, that there is no gaping, and

that the wound heals readily, that the cicatrix usually clears up perfectly and is in any case covered by the upper lid, and that in most cases he obtains a round movable pupil. In many instances he employs no instrument but the Graefe knife. A. J. BALLANTYNE.

(6) **Major Kilkelly**, the Government ophthalmic surgeon in Bombay, gives the results of 23 intra-capsular cataract extractions performed at the C. J. Ophthalmic Hospital, Bombay, by Lieut.-Col. Smith on February 27th, 1909, at the time of the Bombay Medical Congress. The cases were examined by two experienced American ophthalmic surgeons, as well as by Major Kilkelly, from ten to fifteen minutes being taken over each case. On this account, the contribution is a valuable one, although the material is somewhat meagre. Kilkelly says: "We have had reports of these operations from operators all over India, but most of these are merely enumerations of thousands or tens of thousands of extractions performed, and statistics claiming percentage of successes varying from 90 per cent. to 99·5 per cent. Statistics such as these are useless."

He goes on to explain how impossible it is for Smith to know very much about his own results at Jullundur, in the time at his disposal.

In the series of operations there were two vitreous escapes and five cases of rupture of the capsule. The visual results presumably were those obtained at the time of discharge from Hospital, from 15 to 27 days after operation. They were: in 1 case, $\frac{6}{15}$; in 2, $\frac{6}{20}$; in 7, $\frac{6}{30}$; in 3, $\frac{6}{60}$; in 4, $\frac{6}{60}$; in 5 cases, fingers at 10 to 18 feet distance; in 1 case, moving bodies. This corresponds with the observations of others, who have found the early visual results not superior to those of ordinary extraction.

The chief interest of the communication centres in the later complications observed.—In four of the five cases in which the capsule was ruptured, some capsule became impacted in the wound. This complication, therefore, occurred in a very much higher proportion of cases than is met with after well-performed ordinary combined extraction. It is one which has hitherto been ignored in the published accounts of Indian operators. A point much insisted upon as one of the chief advantages of Smith's operation has been the comparative freedom from all capsular after-troubles. The remaining case in which the capsule burst did badly: the pupil became occluded by iritis.

There was incarceration of iris in the wound in 5 cases. The relative frequency of this serious complication has been admitted by some of the most ardent advocates of the method. Major Kilkelly seems to attribute it, possibly in part, to the use of a strabismus hook for replacing the iris. "Further, as the eye is in nearly every instance strongly rotated upwards, it is difficult for the operator to see what the point of the strabismus hook is doing. To some of us onlookers it appeared to be merely stirring up the vitreous."

Vitreous opacities in varying degree were found after 9 of the 23 operations, but in 5 of the 9 cases iritis is also mentioned. Kilkelly thinks that the application of excessive pressure during the operation may be responsible for some of the vitreous opacities. Iritis occurred after 7 of the 23 operations!

It is evident that allowances must be made for the fact that Lieut.-Col. Smith was operating in unfamiliar surroundings (possibly without his own trained assistant). But on this account the figures are the more valuable to the average operator who may think of attempting the operation without first making the pilgrimage to Jullundur. Kilkelly had himself performed about 600 intra-capsular extractions before seeing Smith operate. He had formed an unfavourable opinion of the method, an opinion which is confirmed

by the observation of these cases. "It is clearly shown by these cases that accidents occur and a high percentage of bad results follows intra-capsular extractions, even when the operation is performed by Lieut.-Col. Smith himself, and, for my part, I now feel that the average patient is exposed to an altogether unnecessary danger by the operation." H. HERBERT.

XVIII.—MINERS' NYSTAGMUS.

(1) **Butler, T. Harrison.**—Miners' nystagmus. *British Medical Journal*, March 5, 1910.

(2) **Rodger, T. Ritchie.**—Miners' nystagmus. *British Medical Journal*, April 16th, 1910.

(3) **Arthur, James.**—Miners' nystagmus. *British Medical Journal*, April 16th, 1910.

(4) **Butler, T. Harrison.**—Miners' nystagmus. *British Medical Journal*, April 23rd, 1910.

(5) **Thomas, J. L.**—Miners' nystagmus. *British Medical Journal*, April 30th, 1910.

(6) **Ohm, J.** — Spasm of accommodation and miners' nystagmus. (Akkommodationskrampf und Augenzittern der Bergleute.) *Klin. Monatsbl. f. Augenheilkunde*, Mai-Juni, 1910.

(1) The specialist is familiar with most of the points of symptomatology as set forth by **Butler**, of Coventry. On the obscure subject of the ætiology, the author holds that the views of Snell, Nieden, and Dransart, that the nystagmus is due to cramp of the elevators, does not account for the facts. In the first place, the miner does not strain his eyes upwards, but makes himself comfortable and moves his head, not his eyes. Secondly, there is no proof that any muscle fatigue exists, and if it did exist, it would produce a tetanic and not a clonic spasm. Butler states that the disease does not occur in metal mines in which the worker is not encompassed by glittering black walls. It was first described when the use of the Davy lamp reduced the illumination, and is becoming less common since the Davy lamp has been improved. Yet darkness cannot be the sole cause of nystagmus, since *employées* in photographic factories do not contract it, nor do boiler makers and others who work by feeble light. Snell's cases of nystagmus in compositors are held not to be cases of true miners' nystagmus, which remains a special disease of the colliery. The disease can only be explained as a disordered cerebration, a defect in the brain, not in the eye muscles; this is the theory of Reid (Nottingham) and of Nuel (Liége). ERNEST THOMSON.

(2) **Rodger**, of Sanquhar, reports a case of miner's nystagmus "against the rule," *i.e.*, when the eyes are turned downwards instead of upwards, associated with hemeralopia and giddiness. The visual acuity was normal The patient worked in a damp mine, and on his knees instead of on his side. The exciting cause in this case seemed to be an attack of influenza seven years previously. ERNEST THOMSON.

(3) **Arthur** (Wingate, Co. Durham) does not believe in the constrained position of the body during work as a cause of miners' nystagmus. For one thing, nystagmus is not found in other trades in which work is carried on in a constrained position; for another, the disease has become rarer with improvement in the illumination given by the safety lamp. The disease is more prone to attack the intemperate than the sober liver. ERNEST THOMSON.

(4) **Butler**, replying to a correspondent, states that errors of refraction are found among nystagmic miners in exactly the same proportions as among the rest of the population. Some of the worst cases have been emmetropic and orthophoric. The case published in the *Journal* of April 16th is almost positive proof that cramp of the elevators has nothing to do with the production of the disease, for in this patient nystagmus appeared only when the miner looked down. ERNEST THOMSON.

(5) **Thomas**, of Brynmawr, had seventeen years' experience of colliery practice, and his miners were about equally divided between "naked light" and "safety lamp" mines. Nystagmus was practically absent among the naked light men, but common, especially after influenza and in alcoholics, amongst the safety lamp men. Miners of long experience in naked light seams stated that they had never heard of the disease excepting among those who worked with the safety lamp. In the mines referred to by Thomas the naked light gave illumination so much better than the safety lamp that an extra 2d. per ton was granted for working with the latter whenever a change of illuminant had to be ordered. ERNEST THOMSON.

(6) **Ohm**, who has occasionally seen miners' nystagmus combined with spasm of accommodation, describes three cases in detail. In these, nystagmus was not always present and most pronounced when the eyes were raised. The contraction of the ciliary muscle showed a corresponding variability. In the first case, that of a young miner, aged 17 years, myopia of 4D. was determined by retinoscopy, whereas atropine revealed hypermetropia of low degree. In the second patient, who was 44 years old, an apparent myopia of 2·5 D. gave way under atropine to hypermetropic astigmatism, against the rule, of 0·75 D. The third patient, 38 years of age, had on looking upwards, myopia which ranged between 1·5 D. and 6 D., on looking downwards, his refraction was + 0·5 D. C. MARKUS.

XIX.—REMEDIES.

(1) **Joanin, A.—The Synthetic Suprarenines.** *Bulletin Général de Thérapeutique*, 15th October, 1909.

(2) **Fernandez, Francisco M.—Non-specific uses of antidiphtheritic serum.** *Medical Record*, November 6th, 1909.

(3) **Poulard, A.—Epithelioma of the lid treated by radium.** (Epithélioma de la paupière traité par le radium.) *Archives d'Ophtalmologie*, mars, 1910.

(4) **Davidson, James Mackenzie.—Radium and some of its physical and therapeutic properties.** *Bristol Medico-Chirurgical Journal*, March, 1910.

(5) **Dunn, J.—A report of six cases of crescentic ulceration of the cornea, with comments on the value of peroxide of hydrogen in their treatment.** *Archives of Ophthalmology*, May, 1910.

(6) Wandless, H. W.—Mydriatics and myotics in injuries of the lens and following discission, to hasten dissolution and absorption of the lens substance, and to clear the pupil area of fragments of opaque capsule. *Archives of Ophthalmology*, May, 1910.

(7) Török, E.—Etiology of scleritis, its treatment and results with tuberculin. *Archives of Ophthalmology*, May, 1910.

(8) Derby, G. S.—The best method for the diagnosis and treatment of ocular tuberculosis. *Archives of Ophthalmology*, May, 1910.

(9) Perlmann, Alfred.—On the employment of steam in ophthalmology. (Ueber die Anwendung strömenden Dampfes in der Augenheilkunde.) *Klin Monatsbl. f. Augenheilkunde*, Mai-Juni, 1910.

(10) Gifford, H.—On the treatment of sympathetic ophthalmia with large doses of salicylate of sodium or aspirin. (Ueber die Behandlung der sympathischen Ophthalmie mit grossen Dosen Natron salicylicum oder Aspirin.) *Klin Monatsbl. f. Augenheilkunde*, Mai-Juin, 1910.

(11) Percival, Archibald Stanley.—Miners' nystagmus and formic acid. *Ophthalmic Review*, August, 1910.

(12) Happe, H.—On the supposed tension-lowering action of subconjunctival injections of solutions of salts (potassium-sodium tartarate and sodium citrate) in glaucoma. (Ueber die angebliche druckherabsetzende Wirkung subconjunctivaler Salzlösungen Seignettesalz [Natrium citricum] beim Glaukom.) *Arch. f. vergleichende Ophth.*, Bd. I, Heft iii, S. 317, 1910.

(13) Weekers.—A new treatment of serpiginous ulcers of the cornea by heat. (Nouveau traitement des ulcères serpigineux de la cornée par le chauffage.) *Bull. de la Société Belge d'Ophtalmologie*, 1910, p. 70.

(1) In this interesting but somewhat brain-racking little article concerning dioxyphenylethanolmethylamine (adrenaline or suprarenine as extracted from the suprarenal bodies) and the synthetic body prepared by Friedsmann and by Stolz, Joanin sets forth the principal facts as follow.—(1) The study of the different derivatives obtained along with suprarenine (*à côté de la suprarénine*), gives fresh evidence of the relations which exist between the chemical constitution of a body and its pharmacodynamical action. All the compounds obtained along with suprarenine possess pharmacologically the same properties only with a greater or less toxicity on "hypotenser" power. Joanin shows by formulæ that aminoacetopyrocatechine, methylamino-aceto-pyrocatechine and ethylamino-aceto-pyrocatechine (Homo-renone) have from fifty to one hundred times less toxicity than natural suprarenin. So also alongside of synthetic suprarenine we have dioxyphenylethanolethylamine (arterenol) and dioxyphenylethanolethylamine both of feeble toxicity compared with synthetic suprarenine (dioxyphenylethanolmethylamine). On the one hand, *homorenone*, and, on the other hand, *arterenol* have been used therapeutically. (2) When natural and synthetic suprarenine are compared, it is found that they differ optically. Natural suprarenine is lævo-rotatory, synthetic suprarenine, as first prepared by Stolz, was optically inactive. It was reasonable to consider that the synthetic product was the racemic form of suprarenine. Flacher thus found that synthetic suprarenin is divisible into two components, one dextro- and the other lævo-rotatory. And also that the lævo-rotatory suprarenine was optically the same as natural suprarenine. (3) A comparison of natural suprarenine with the various synthetic

suprarenines from the pharmacodynamical standpoint shows that L. suprarenine is quite comparable with the natural body, and may be used in the same cases as natural suprarenine or adrenalin.

ERNEST THOMSON.

(2) **Francisco Fernandez** remarks as to the efficacy of antidiphtheritic serum in numerous diseases, including suppurative keratitis, are unaccompanied by any case-details. ERNEST THOMSON.

(3) **Poulard**, of Paris, records an excellent result in the treatment of an epithelioma of the lid by radium. The tumour has been present for twenty years as a small nodule on the border of the lower lid at its inner side. For two years it had slowly increased, and when first seen by Poulard, presented the clinical aspect of a typical epithelioma with ulcerating surface and deep infiltration involving the tarsus. Histological examination showed that the growth was of embryonic type, with cells resembling those of the Malpighian layer. Cell-nests were present and the description "plasmodial epithelioma" was given to it.

Six milligrams of pure sulphate of radium were used, the rays being as follows:—α, 10 per cent., β, 86·5 per cent., γ, 3·5 per cent. Exposures were made for 40 hours in 12 *séances* of 3 to $3\frac{1}{2}$ hours each and spread over a period of 42 days. In addition, three other exposures of two hours each were given without the interposition of a lead screen. Regression commenced in 15 days, and cure was considered complete after $4\frac{1}{2}$ months. A soft cicatrix remained, but was hardly noticeable. BERNARD CRIDLAND.

(4) **Mackenzie Davidson's** paper on radium should be read in the original. So far as oculists are specially concerned, it contains references to the cure of rodent ulcer of the eyelid, spring catarrh, hypopyon-ulcer of the cornea, episcleritis, pterygium. Some of these cases have been reported by the author and Arnold Lawson in *Transactions Ophthalmological Society U.K.* for 1909. ERNEST THOMSON.

(5) In three of these cases of crescentic corneal ulceration, hydrogen peroxide was used, with the result that the whole area of infection was immediately marked out, owing to the fact that the peroxide produced bubbles within the layers of the cornea to a considerable distance beyond the apparent area of ulceration. **Dunn** advises that the plan of procedure in treating these cases should be to, first, after the application of cocaine, rub the corneal surface over, and in the neighbourhood of the ulcer with a bit of cotton wrapped closely about the point of a fine probe, and then to touch the surface thus rubbed with cotton soaked in hydrogen peroxide, full strength. A boric-acid-atropine salve should be put into the eye twice daily, a boric acid salve every hour. The peroxide should be used once or twice daily. Possibly, this treatment will obviate the necessity for cauterisation. ROSA FORD.

(6) A traumatic cataract, with iritis, under the influence of atropine and hot fomentations, showed progressive absorption for eight weeks, so that vision with a + 7D, lens was $\frac{20}{100}$, after which for seventeen days no further improvement took place. Alternate instillations of atropine and eserine were then employed, and improvement began again at once and continued till vision became normal with a + 12D. lens. Further observations have confirmed the author's faith in the value of this treatment, and he now uses it in all similar cases as well as in discissions, and after cataract extractions, except when there is increased tension. Atropine should be given for one to three days, four or five times daily, and then eserine instilled for one to three days or until the atropine is overcome, three or four times daily.

ROSA FORD.

(7) In a series of 15 cases, **Török** found tuberculosis certainly in the family in four cases and probably in two others ; in five cases tuberculosis was also present elsewhere. T. V. was adminstered in 14 of the cases, and 12 gave a positive result. T. R. was administered in 11 cases : in ten perfect cure resulted, and the patients have been without a relapse for eight months to four years. In the author's opinion, scleritis is probably always due to tuberculosis ; he advises a diagnostic injection of tuberculin in every case, and even where this is negative, treatment by tuberculin injections should be employed.

ROSA FORD.

(8) In the diagnosis of ocular tuberculosis, the clinical appearance is sometimes useful, sometimes not ; of 34 cases, **Derby** found a bad family history in 20·5 per cent. ; previous eye trouble had existed in 58 per cent. of the cases in one year ; physical signs of tuberculosis elsewhere existed in 69 per cent. of the cases in one series, and 53 per cent. of another ; a majority of the cases tended to run a slightly increased temperature. A positive Wasserman's reaction often prevents a serious blunder, and when all other means have failed, the subcutaneous injection of tuberculin should be tried. Treatment is best carried out in the patient's home, since neither hospital nor sanatorium is properly adapted for eye cases of tuberculosis. Patients attend once a week at least, and their observance of orders is watched over by a social service worker who visits the homes. Tuberculin is used by Derby in nearly all cases. ROSA FORD.

(9) **Perlmann** pleads for a more extensive use of steam in a variety of eye-diseases. He has devised a small cheap apparatus for the boiling of water and the emission of steam through two pipes. The mouths of the latter are funnel-shaped and covered with wire netting ; the patient approaches them as near as is possible without discomfort from the heat, and keeps his eyes open or shut according to the disease or the required intensity of effect. A sitting lasts from 10 to 15 minutes, and it is repeated three to four times a day. Hot vapour thus applied exerts a nutritive stimulus upon the tissues of the eye, alleviates pain, as in neuralgia, promotes the formation of pus in virulent affections of the lids and lacrymal sac, and prepares the conjunctiva in chronic catarrh for the energetic action of a stringent collyria at the same time diminishing their irritative effect. If applied after the instillation of holocaine, steam seems to be able to influence the deeper parts of the eye. Perlmann saw in a case of traumatic cataract more rapid disintegration and subsequent absorption of the lens. C. MARKUS.

(10) **Gifford,** of Omaha, advocates large doses of salicylate of sodium or one of its substitutes, like aspirin, in sympathetic ophthalmitis. He gives two grammes five times daily in half a tumbler of water with two teaspoonfuls of brandy. The salicylate is stopped every fourth or seventh day according to the gravity of the case. If the drug is not tolerated by the stomach, it can be given in an enema : four grammes in a tumbler of warm water, two to three times daily. The internal medication is supplemented by the inunction of mercury ointment. This treatment failed only in two of sixteen cases of sympathetic ophthalmitis, in all of which the primarily diseased eye was removed. C. MARKUS.

(11) In a suggestive little communication, **Percival,** of Newcastle-on-Tyne recommends the administration in cases of miners' nystagmus of from five to ten drops of formic acid (25 per cent. solution) three times a day.

SYDNEY STEPHENSON,

(12) Yet another treatment of glaucoma is nipped in the bud by **Happe.** It had been found by Fischer that if a freshly excised eye were placed in an acid or alkaline solution, it took up water and became harder, but that this

did not occur in presence of a salt. It was surely an extravagant assumption to suppose that the living eye, with an active circulation and capable of responding to an irritant, would react in the same manner as the dead eye, with all its vessels and lymph spaces laid open, in a pot of fluid; but undeterred by such considerations, and probably on the principle of "nothing venture nothing win," Fisher applied these observations to the treatment of glaucoma, first by conjunctival irrigations, and when these proved insufficient, by subconjunctival injections of a 5 per cent. solution of sodium potassium tartarate and sodium citrate. As is frequently the case with a new method, the results were excellent. Within a few minutes of the injection, all the glaucomatous symptoms were relieved, and a lowering of tension was produced which lasted from three days to some weeks. Happe justly objects that in a research of this kind tonometry should be used, and that testing with the finger is not sufficiently delicate, especially after a saline injection. By applying tonometric methods he obtained the following results.– Out of seventeen cases, slight lowering of tension, but not so much as was produced by eserin, occurred twice; in three non-glaucomatous eyes, and in two with absolute glaucoma no effect was produced; in the remaining ten the tension was raised, probably from irritation of the ciliary body and hypersecretion.

GEORGE COATS.

(13.) By **Weekers,** of Liége, the principle of fractional sterilisation has been applied to the treatment of serpiginous ulcers of the cornea. The cautery at a red heat is held near but not in contact with the cornea for five or six minutes upon two or three separate occasions. The surface of the ulcer tends to become dry under the influence of the heat, and it may be moistened during the application by a little sterilised physiological salt solution. The *chauffage* has no harmful effect upon the cornea, which does not for an instant lose its transparency. A few hours after the application, the surface of the ulcer becomes covered with a delicate whitish membrane, and the hypopyon becomes larger. These appearances simply show that the *chauffage* has provoked a considerable access of leucocytes. Eleven cases of hypopyon-ulcer due to the pneumococcus have so far been successfully treated in the way described by Weekers, who also employed hot compresses, atropine, and argyrol. In future cases the author purposes to employ, in addition to *chauffage*, local applications of bile, since it has been shown that bile exerts a powerful bacteriolytic action upon pneumococci. Instead of bile, it is more convenient to employ a 2.5 per cent. solution of the taurocholate or glyocholate of sodium by instillations repeated five or six times a day.

SYDNEY STEPHENSON.

BOOK NOTICES.

Manual of Military Ophthalmology. By M. T. YARR, Lieut.-Colonel Royal Army Medical Corps. 2nd edition, 1909. Cassell and Company: London, New York, Toronto, and Melbourne. Price, 4s. 6d. net.

The underlying idea of this work is good, but its claim to acceptance as the work of an expert is rudely shaken by some glaring errors it contains. These errors have, strange to say, lived through two editions. For instance, it is stated on page 9 "that the minimum visual angle has been found experimentally to be 1°; again, on page 10, it is stated that the whole of one of Snellen's letters "subtends an angle of 5°." This very elementary

mistake of a degree for a minute is repeated too often for it to be ascribed to the "printer's devil." Equally astonishing is the remark on page 47, that the use of a minus glass before a normal eye makes the eye myopic; it is obvious that it makes it hyperopic, and not myopic. On page 23 the use of the plane mirror is dismissed in a paragraph, the observer being directed to stand 4·5 metres away from his patient. There is a want of elasticity about such directions which will unfairly contribute to the unpopularity of the plane mirror method with Colonel Yarr's readers. On page 76, in connection with malingering, it is stated that "bilateral defective vision is seldom assumed." This assertion needs wide modification if our Indian Army is to be taken into consideration, as it assuredly should be in such a manual. In the reviewer's experience, the Indian sepoy who feigns defective vision, almost invariably complains of bilateral loss of sight. On this topic a very interesting and instructive chapter might easily have been written, but the matter is dismissed in a curt paragraph, whilst many subjects which do not belong strictly to the domain of the book, are taken up at length. The chapter on glaucoma should have been re-written; no mention is made of Herbert or of Lagrange, nor is sclerectomy even hinted at. The statement on page 204 that the dissecting out of the lacrymal sac "is a most difficult operation and seldom successful," is in direct contradiction of all our experience in the South of India, where many surgeons are performing the operation frequently and with excellent results. One notes with surprise the omission of all reference to the many valuable pieces of modern apparatus which are so useful to the ophthalmic surgeon. Even if the military ophthalmologist does not handle the diaphanoscope or the corneal microscope, it is as well he should know of their existence. Many other instances might be cited, but the most prominent omission of them all is that of the electric ophthalmoscope, which has revolutionised ophthalmoscopic examination wherever it has been introduced.

The chapters on malarial affections of the eye, and on other tropical eye diseases, are among the most interesting in the book; but the reviewer regrets that he constantly finds himself in disagreement with the statements made or with the form in which they are made. They strike him as being gleanings from many sources, rather than as the outcome of the mature and extensive experience of an expert writer, whose *dicta* one may accept without the unrestful attitude of constant scepticism. Colonel Yarr comments on the "few words" in which "text books of the eye as a rule dismiss the subject of malarial eye affections." The reviewer is not satisfied in his own mind that their attitude is incorrect; there is probably a strong reason for such abstention, considering the number of very excellent text-books in existence.

On page 129 we read "Wherever malaria is prevalent, there, too, will cases of quinine amaurosis be frequent, owing to careless administration of the drug." The literature of the subject has certainly never presented the case in this aspect to the reviewer. Speaking for one area in which malaria is widely prevalent, he can state unhesitatingly that the above *dogma* is incorrect. In an experience of a good many years of an eye hospital with an out-patient roll of 10,000 new cases annually, he can recall only three cases of undoubted quinine amaurosis. Optic atrophy with great contraction of the arteries is not very uncommon, but the evidence connecting the condition with either malaria or cinchonism is by no means strong. In any case one may be permitted to doubt whether the remarks on page 131 are either judicious or loyal to the medical profession.

In conclusion, the reviewer regrets that he is unable to recommend this *Manual* in its present form. It requires re-writing and bringing up to date. The idea is good, but the execution is defective. R. H. ELLIOT.

On Palliative Trephining for Choked Disc. (Ueber die Palliativtrepanation bei Stauungspapille.) By E. von Hippel. W. Engelman, Leipzig, 1909.

This most interesting monograph of 95 pages is an amplification of the author's paper on the same subject, which appeared in Vol. LXIX of v. Graefe's *Archiv*, and is based on a more extended review of the literature, including 51 new cases, in addition to the 221 analysed in the first communication. Apart from the scientific interest which the operation possesses as to the bearing of its results on the pathology of optic neuritis, it is a matter of great practical importance for ophthalmic surgeons, since choked disc may not alone be the earliest symptoms of an intracranial affection, but may even furnish the only indication for operative interference, as to the advisability of which the ophthalmic surgeon may be asked for a definite opinion. Most of the progress which has been made in this department of surgery is the outcome of work by English and American surgeons, and the German literature of the subject is still very scanty. Indeed, Uhthoff in the recent edition of the Graefe-Saemisch *Handbuch* goes so far as to say that "cases are rare in which trephining for choked disc with the object of preserving sight, call for consideration in practice." v. Hippel strongly opposes this view, and expresses the hope that the conviction will become general that it is possible to prevent blindness in a large percentage of these cases by timely interference He then proceeds to discuss the subject in the following order, *viz.*: the effect of the operation on the vision; the duration of the result; objections to the operation; its dangers, immediate and remote; methods of avoiding these dangers, including operative details, and he winds up with a discussion on the pathogenesis of choked disc. Incidentally, reference is made to the effects of lumbar puncture and to other methods of cerebro-spinal drainage still on their trial.

Palliative operations include, according to the author, not merely those cases in which the relief of intracranial pressure was the sole and primary aim, but also those in which, for any reason, removal of the disease was attempted but was found to be impossible.

The first question to be considered is, what results can be expected from palliative trephining. Now the experience of neurologists and surgeons has definitely shown that optic neuritis subsides, almost without exception, after a radical operation, and very frequently after simple "decompression." v. Hippel's more recent statistics bear this out, and fully corroborate the statement made in his original paper, namely, that choked disc disappears after operation in a large majority of cases, but that the prospects of retaining or improving the vision are favourable only when the patient still has "practically useful vision" before the operation. Marked contraction of the fields is quite as unfavourable as very defective central vision. In cases also of cerebral tumour with choked disc, early operation preserves the sight in the majority of instances, and sometimes even when the vision had been previously very much reduced. In the author's opinion, the operation has been delayed too long in a very large number of the cases hitherto recorded. He knows of no case of cerebral tumour in which a *permanent* cure of a choked disc was obtained by lumbar puncture, but in serous or syphilitic meningitis and in injuries of the skull accompanied by optic neuritis it deserves a trial before trephining is resorted to. It is generally recognised that lumbar puncture is too dangerous a procedure in tumours of the posterior fossa.

The objections to the operations are next dealt with. The first and most obvious is that recovery may take place spontaneously, or under medicinal

treatment, especially in syphilis, and it must be admitted that here general treatment and lumbar puncture should be first resorted to, except in cases of cerebral gummata, in which, as experience has shown, medical treatment is often too slow in its effects to prevent blindness. Indeed, the author believes that gummata should be regarded from the same standpoint as other cerebral tumours, and that these cases should be trephined when vision, in spite of energetic treatment, becomes at all seriously affected. Cases of spontaneous cure are also met with in non-syphilitic patients—for example, in chronic hydrocephalus, pseudo-tumours (Nonne), brain swelling, serous meningitis, etc., but unfortunately it is impossible to say how often such cases present the symptoms of intracranial tumour, or to decide whether a given case will recover, and we know that only too often recovery follows at the expense of an incurable blindness. Therefore, operation should be recommended as soon as possible, and v. Hippel considers it questionable whether one should wait until the vision begins to fail in cases which come under observation in the early stage. This is the view of those who have had most experience, as Frazer, Cushing, Burchalt, Kocher, and Horsley. The objection that a palliative operation may prevent the development of localising symptoms and so interfere with a radical cure, should not be considered, because it is impossible to say how often this may occur, and, further, a radical cure in tumour cases reaches only 3 or 4 per cent. It is also complained that a palliative operation is unsatisfactory, because it does not attack the disease, and that since in the majority of cases of choked disc cerebral tumour is the cause, the fatal result is thereby merely postponed. To this v. Hippel replies that a mere postponement of the end is not always the result of trephining, but that complete recovery occasionally follows even in these cases. Besides, the duration of life after successful trephining is such that the operation is most praiseworthy, more especially as other distressing symptoms, headache, vomiting, etc., are at the same time cured, or benefited, and the remainder of the patient's, otherwise miserable, existence is thereby rendered comfortable or at least endurable.

While the danger of palliative trephining must not be minimised, it should be remembered that some of the statistics give too high a percentage of deaths, owing to the inclusion of radical and osteoplastic operations. v. Hippel's analysis of purely palliative operations gives 56 deaths in 269, not quite 21 per cent., and men of great experience like Horsley, Kocher, and Cushing, regard the danger as very slight. It may also be assumed with great probability that the danger of death is very much less when the operation is performed in cases where the vision is still good, and the other symptoms not very advanced, and these are just the cases in which ophthalmic surgeons may be called upon to recommend an early operation.

The immediate dangers of the operation can be avoided by improvements in *technique*, such as the use of chloroform instead of ether, operation in two stages, cocainisation of the dura, avoidance of sudden outflow of cerebro-spinal fluid, careful suturing of soft parts, non-use of hammer and chisel, etc. Large osteoplastic operations should be tabooed.

In some instances, and they are in the minority, a permanent reduction of intracranial pressure can be brought about without opening the dura. The hernia cerebri which appears so frequently in cases of cerebral tumour after trephining operations must not be prevented, as it is necessary; but it can be kept within certain limits by careful suturing of muscle, fascia, and skin. The right sub-temporal region (except in left-handed people) should be selected for the operation when the lesion cannot be localised.

It is interesting to note that Cushing and Bordley, who successfully

trephined cases of albuminuric retinitis, regard this affection as a modified form of choked disc, and as an expression of increased intracranial tension. They found that 18 cases of cerebral tumour out of 200, presented a typical picture of albuminuric retinitis and in 12 of these there was no reason, on clinical grounds, to suspect disease of the kidneys. They believe that cerebral œdema plays a more important part than toxins in the production of uræmia and that this explains the rapid relief of the uræmic symptoms after the operation of decompression.

The subsidence of the swollen disc varies very much in rapidity in different cases. It has been observed to begin in a couple of days, but usually does not make its appearance until about a week after the operation. Improvement in the vision may precede the beginning of the change in the optic disc. A patient of the reviewer's, operated on two years ago and now enjoying good vision, noted an improvement in her sight the day after the operation. This patient has a slight hernia cerebri, which does not cause her much inconvenience.

In conclusion, v. Hippel discusses the pathogenesis of choked disc in the light of the *data* derived from the results of palliative trephining, and remarks at the outset that a division of papillitis into two forms, *viz.*, optic neuritis due to toxins, and choked disc resulting from mechanical causes, is unjustifiable on clinical as well as on pathological grounds. He does not, of course, deny the existence of an inflammatory process as a cause of swelling of the disc, but points out that it is impossible clinically to know by the mere appearance what the cause is. A so-called neuritis may become converted into a choked disc, and *vice versâ*.

The rapid improvement which follows the operation of trephining speaks against the toxic and in favour of the mechanical theory, more especially when the effect is obtained without opening the dura. It may be objected that in the ordinary palliative operation, when the dura is opened, the toxins are removed with the escaping fluid, but this would not explain the fact that the lesion (tumours, etc.), giving rise to the supposed toxins, may still remain, and nevertheless the neuritis and other symptoms improve or disappear altogether. Moreover, the presence of these toxins has not been proved, and the assumption of their existence is unnecessary until it is shown that increased intracranial pressure in itself is insufficient to produce choked disc; whereas a large number of cases has been recorded by competent observers in which no evidences of inflammation were present in the swollen nerve-head. Furthermore, choked disc is found in cases, where the intracranial contents are increased in volume, without any question of toxins being generated, as in cysts, aneurisms, and extra-dural hæmatomata. Headache and vomiting which accompany the double optic neuritis occur without any signs of inflammation, and why attribute the latter to a different cause?

v. Hippel proceeds next to discuss the value of some of the signs of increased intracranial pressure, such as flattening of the cerebral convolutions, dilatation of the optic nerve sheaths, etc., and the relation which they bear to the presence or absence of choked disc. He points out the sources of error which may arise in estimating the presence or absence of intracranial tension. Indisputable evidence of this exists, however, in the bulging and absence of pulsation of the dura so often noted in cases of tumour, as well as in the increased flow of cerebro-spinal fluid in lumbar puncture, and he arrives at the conclusion that no proof exists, in tumour cases at any rate, that choked disc can occur without increased tension within the skull. The fact that small tumours may cause intense swelling of the disc finds its analogy in the absence of a definite relation between the size of the tumour and the intraocular tension in intraocular sarcomata. The

experimental investigations of Cushing and Bordley are also in favour of the pressure theory. The author agrees with Hoche that marked nerve degeneration, as shown by Marchi's method of staining, may exist in cases of choked disc without any signs of inflammation. Many other interesting points are mentioned, which space compels us to omit.

In conclusion, a short reference is made to Cushing's observations on the colour fields in cases of cerebral tumour. He finds that the earliest symptom, preceding even optic neuritis, is a reversal or overlapping of the colour fields, and that after "decompression" they rapidly resume their normal relations. In the absence of double optic neuritis, this symptom, if corroborated by future observers, will render the differential diagnosis in cases with apparently hysterical symptoms still more difficult.

An extensive bibliography completes this excellent monograph.

LOUIS WERNER.

Syphilis. By SIR JONATHAN HUTCHINSON, F.R.S., etc. New and enlarged edition, 1909. With twelve coloured and twenty-four black and white plates. Cassell & Company, Limited. Price, 10s. 6d. net.

In dealing with a well-known and oft-consulted work such as this it is not necessary to call the attention of the ophthalmic surgeon to the various general qualities of a book by an author whose name is known the wide world over. It must suffice that a brief note of the general scope be given and some more special remark made upon the statements concerning eye diseases in syphilis.

The first chapter is concerned with the history of syphilis in Europe, and it is to be noted that the author is a strong adherent of the school which maintains that this disease was introduced into Europe by the followers of Columbus, who, returning from the West Indies laden with the germs which they had accepted, with other favours, from the ladies of San Domingo, disseminated the said germs freely in their own and other countries. We confess that we cannot help having some doubts as to the facts, and we are inclined to think that the perusal with unbiassed mind of a work such as that of Buret (Paris, 1890) would lead others to have similar doubts.

The writer passes on in subsequent chapters to review the various aspects of the disease from the clinical, social, and, we may say, the medico-legal standpoints, indicating many interesting and important facts with regard to the transmission of infection by parents to the second and third generations. He practically denies the possibility of third generation inheritance; at all events, he has never been able to prove it. He reiterates the fact that a person may have more than one attack of syphilis, and illustrates his statements by cases quoted. Lastly, he emphasises strongly throughout his work the advantage of the "small dose treatment," which is now fairly generally adopted.

Eye diseases in syphilis are grouped, so far as possible, under stages, but it is to be noted that no special mention is made of primary sores on the lids or conjunctiva.

In the secondary stage, iritis is ably described and its characteristics are pointed out. The occurrence of rust-coloured nodules is considered to be pathognomonic. The fact that the second eye may be affected, in spite of successful treatment of the first, is put strongly before the reader. Retinitis and choroiditis occur six months later than iritis. Diffuse keratitis is one of the most rare secondaries, only a few cases having been described.

"Inflammation of the vitreous body" is the name given to one of the secondary affections, and in the light of more recent views on the subject, it

might have been better to avoid the use of the term. Similarly, the old name "aquo-capsulitis" is used for "simple" or "serous cyclitis," and is said to be a form of chronic iritis.

In connection with inherited syphilis there are many different forms of eye disease. Acute iritis in infancy is rare and is often difficult to recognise as it is "quiet," and it is not until the eye is more or less seriously damaged that the patient is brought. Well-marked exudate into the pupil is one of the characteristics. Chorio-retinitis, similating retinitis pigmentosa, and disseminated choroiditis are frequent, as is the well-known keratitis, but serpiginous choroiditis is very rare.

Regarding the important question as to the value of past choroiditis as evidence of inherited syphilis, Hutchinson says that when this sign occurs alone, it is to be regarded as untrustworthy.

The treatment of all syphilitic eye diseases must be mercurial, with or without the use of iodides.

It must be remembered that the account of the eye diseases in connection with syphilis is not written for ophthalmic surgeons, but, at the same time, whilst there is much in the book that is of the greatest interest and importance in regard to the subject, one cannot help feeling that more, from such a boundless storehouse, would have been welcome. It is clear, from the footnote on page 10, that the author regards the spirochæta as the cause of syphilis, but he says little as to the presence of the organism demonstrated in various parts of the body, and in diverse conditions, such as keratomalacia, which would have been of interest. One could have wished, also, that more had been said on the subject of the serum diagnosis, an important matter which is relegated to the appendix.

The volume is well "done" and the illustrations are excellent and on suitable paper. There are very few errors, "core" for sore, on page 6, being the only one which attracted attention.

In conclusion, we think that no medical man can afford to be without this book.

LESLIE BUCHANAN.

CORRESPONDENCE.

While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

THE NEWER OPERATIONS FOR GLAUCOMA.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

In his extremely interesting and exhaustive review of "The Newer Operations for Glaucoma," Dr. A. J. Ballantyne discusses the question of the existence of a filtering cicatrix, and in so doing he mentions a sign which was first pointed out by Herbert, and which can be easily proved by anyone who has the opportunity of examining such cases. I refer to the marked increase of the œdema over the scar on manipulation of the eyeball. A fall in the tension of the eye is simultaneously observed. A reference to the four cases published by me in the December, 1910, number of THE OPHTHALMOSCOPE, will show that this sign was noted in each one of those four cases. Apart

from them, I have noticed it with great regularity, and am accustomed to demonstrate it to visitors and others whenever a filtering scar returns to my clinic. A few moments of digital massage serves to bring out the sign with unfailing regularity. If not, I should hesitate to accept the scar as a filtering one.

My excuse for drawing attention to the matter is that it seems to me to furnish very strong evidence of the actual existence of a communication between the raised filtering scar and the fluids circulating within the eyeball. Indeed, I am at a loss to understand what other interpretation can be put on the phenomenon.

Yours faithfully,

R. H. ELLIOT,
M.D.Lond., etc., Major I.M.S.

Government Ophthalmic Hospital,
Madras, S. India.
July 16th, 1910.

"BLUE" SCLEROTICS.

To the Editor of The Ophthalmoscope, *London.*

Dear Sir,

I have read with great interest the description of a case of "blue sclerotics" in the May number of The Ophthalmoscope, and was struck by the resemblance of your case to that of the case which I described at the Ophthalmological Society on 13th March, 1903 (ref. *Transactions Ophthalm. Society* U.K., Vol. XXIII, p. 267). It occurs to me that the cases are of similar nature, and it is probable that the histological characters which were found in my case would be found in your case also.

In Bishop Harman's "Pedigree," it is interesting to notice the fact that no case examined appeared to have conical cornea or high myopia.

The cases are of such great interest that all information on the subject should be brought, so far as possible, together, and this must be my excuse for calling attention to the matter.

Yours truly,

LESLIE BUCHANAN.

17, Sandyford Place, Glasgow,
August 2nd, 1910.

THE SCHIÖTZ TONOMETER IN THE ESTIMATION OF INTRAOCULAR TENSION.

To the Editor of The Ophthalmoscope.

Sir,

The ultimate fate of an eye occasionally depends on the early, accurate, and correct estimation of its tension. Nowadays, since instruments have come to play such an important part in clinical examination, it is surely justifiable to assert, without fear of treading on the toes of any ophthalmic surgeon, that his fingers are a crude and somewhat antiquated instrument to use for such a delicate test. What would one think of the physician who tested the presence or absence of a rise of temperature by the sense of touch alone, as used to be done? The very terms we use tell their own tale of

vagueness and indecision. When we send a patient to the physician to have his blood-pressure taken, he does not record it as "? −," "? +," or the like He notes it in the actual number of mm. of mercury.

Then, again, I think most ophthalmic surgeons will admit that some days they do not feel in as good "form" for taking tensions as others, *i.e.*, they have a feeling of more uncertainty than usual. That many ophthalmic surgeons are unfamiliar with the tonometers made for this particular use, cannot, I think, be denied. At all events, a little time ago I got a Schiötz's tonometer from a London firm of instrument makers, but feeling somewhat uncertain as to the correct method of using it, I wrote to a well-known London ophthalmic surgeon on the subject. His reply was that he had never seen the instrument, and as far as he knew, there was not one in London.

Many thanks are therefore due to Mr. Bernard Cridland for his able demonstration, given at this year's (1910) Oxford Ophthalmological Congress, of the method of using this instrument. In addition to the details of the method of using the instrument, one might also note the following two points—(1) It should not take a great amount of practice to learn to apply the instrument correctly (certainly far less than it takes to enable a man to make accurate observations with the ophthalmoscope or retinoscopy mirror), and (2) that its application for a reading of the pressure would not occupy as much time as frequently does the estimation of the field of vision. Finally, let it not be forgotten that Mr Cridland's demonstration drew from Dr. Holth, of Christiania, a man of no little experience and authority, the statement that he had long since learned to distrust his fingers, and that *he had by means of the instrument discovered a rise of tension in cases in which he had not detected it by the usual method.*

Yours, etc.,

August 22nd, 1910.

ARTHUR GREENE,
M.A., M.D., F.R.C.S. Assist. Surgeon,
Norfolk and Norwich Eye Hospital.

NOTES AND ECHOES.

Deaths.

We regret to announce the death of Marc Dufour, which occurred suddenly from apoplexy on the 29th of July last while engaged in a consultation at the Lausanne *Augenklinik*. Dufour, who was born in 1843, at Villeneuve, belonged to the old guard in ophthalmology. He received his doctorate in medicine in 1865 from the University of Zürich. He worked under Horner, in Zürich, Liebreich, in Paris, and von Graefe, in Berlin. In 1869, while still assisting von Graefe, Dufour received a call to assist (and eventually to replace) Dr. Recordon at the Lausanne *Asile des Aveugles*. Dufour served with the Swiss Ambulance Corps in the Franco-German war, and after that took up his work once more in Lausanne, where he founded the Ophthalmic Institution, and became professor of ophthalmology in the University, posts that he retained until his death the other day. Dufour was a man of many activities—a politician, a publicist, a philanthropist, an orator, and a charming talker. "*C'etait un homme complet*," as an admirer remarked of him, a tribute that will be re-echoed by all who had the privilege and pleasure of

his acquaintance. The *Légion d'Honneur* was bestowed upon Dufour by the French Government in 1906. Many of our readers will remember that in 1909 he attended the meeting of the Oxford Ophthalmological Congress, when he made many friends by his genial presence, his ready wit, and his charming urbanity. Dufour contributed much to the literature of his

The late Dr. Marc Dufour.

speciality. His period of literary activity extended from the publication of his thesis in 1865 (*Le constance de la force et les mouvements musculaires*) to last year, when he contributed two communications to the columns of THE OPHTHALMOSCOPE. Dufour's skill and amiability secured for him a large practice, which numbered amongst its members many English patients. To Dr. Othmar Dufour, the son of the deceased Professor, THE OPHTHALMOSCOPE tenders its sincere sympathy.

Dr. Ferdinand Plehn has died at Steglitz. He practised ophthalmology for many years in Paris.

Dr. Edward C. Adams, of St. Joseph, Mo., died on May 14th, 1910, aged 52 years, from cerebral hœmorrhage.

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Appointments.

DR. ANGUS M'GILLIVRAY has been re-appointed for the next academical year lecturer on ophthalmology in St. Andrews University.

Mr. Frank A. Juler has been appointed ophthalmic surgeon to the East London Hospital for Children, Shadwell, *vice* W. Ilbert Hancock, deceased.

Having failed to obtain the necessary assistance from the Cottage Hospital in dealing with cases of defective eyesight among children attending the Acton Elementary Schools, the local education committee has appointed Dr. Grace Banham as oculist for twelve months.

We understand that Surgeon-Major F. Kinealy, formerly house surgeon at the Royal Westminster Ophthalmic Hospital, has been appointed to the personal staff of the new Viceroy of India.

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Honours.

CONGRATULATIONS to Dr. Victor Morax, of the Lariboisière Hospital, Paris, who has been advanced to the grade of *Chevalier de la Légion d'Honneur*.

Upon Dr. Hermann Kuhnt, of Bonn, has been bestowed the Order of the Prussian Red Eagle, of the third class, with clasp.

Professor Uhthoff has been appointed Dean of the Medical Faculty of the University of Breslau.

Upon Dr. van Schevensteen, of Antwerp, has been bestowed the Cross of the *Chevalier de l'Ordre de Léopold*.

The title of professor has been bestowed upon Staff-Surgeon Dr. Napp, of the first University *Augenklinik* in Berlin; upon Dr. Herzog, of Berlin; and, lastly, upon Dr. Wessely, of Würzburg.

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Foreign Items.

DR. WENDELL REBER has been elected professor of ophthalmology in the Philadelphia Polyclinic, *vice* Dr. James Thorington, resigned.

Dr. William Zentmayer has been appointed extra-mural lecturer on ophthalmology to the same institution.

Dr. Adolph Alt, of St. Louis, has been elected vice-president of the American Academy of Medicine.

Dr. Wolfgang Stock has succeeded Professor Wagenmann, in the professorship of ophthalmology at Jena.

Dr. Lagrange, *professeur agrégé*, has been nominated professor of clinical ophthalmology in the University of Bordeaux, in succession to Dr. Badal.

Dr. Rudolf Schneider has been recognised as *privat-dozent* of ophthalmology in Munich.

We learn that despite his resignation of the Chair at Heidelberg, Professor Leber is to continue to hold office as President of the Heidelberg Ophthalmological Society. A graceful compliment to a distinguished man!

Dr. Stock has gained the Graefe Prize for his work on tuberculosis and the ætiology of chronic iritis.

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Dr. Traquair has been appointed assistant ophthalmic surgeon to the Leith Hospital.

Mr. Charles A. Adair Dighton has been appointed ophthalmic and aural surgeon to the Scarborough Hospital and Dispensary.

Hospital Patients.

A REMARKABLE discussion recently took place at a meeting of the Coventry and Warwickshire Hospital Committee. Objection was raised by representatives of the Hospital Saturday Working Men's Committee to the words "men and women" being placed over the entrances in the new out-patient department, for which the Working Men's Committee had raised the money. It was contended that these words gave an impression of class distinction, and should be altered to "ladies and gentlemen." The chairman replied that the words used were in accordance with general hospital practice, and said the proposed alteration, if accepted, would be ridiculed all over the country. The matter was adjourned for a month.

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St. Paul's Eye Hospital, Liverpool.

ON July 21st the Earl of Derby laid the foundation stone of the new St. Paul's Eye Hospital, Liverpool. There will be a special department for the treatment of ophthalmia neonatorum to form a memorial to Dr. George Edward Walker, the founder of the original hospital forty-one years ago. The building is to cost £15,000, of which the larger part has already been subscribed.

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Ophthalmic Surgeons in Germany.

SOME interesting figures are given by Dr. Greven in our contemporary the *Wochenschrift für Therapie und Hygiene des Auges* concerning our ranks in Germany. In September, 1908, according to Dr. Greven's figures, there were 913 ophthalmologists in Germany — that is to say, they formed 2·87 per cent. of all registered medical practitioners. Dr. Greven calculated that there was one ophthalmic surgeon to every 67,500 inhabitants. In Berlin and its suburbs ophthalmologists numbered 117.

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The American Ophthalmological Society and "Optometrists."

THE following resolution has been adopted by the American Ophthalmological Society.—"Whereas, the American Ophthalmological Society is strongly opposed to the so-called "optometry" bills, which are now being brought before our state legislatures, and whereas this legislation is unwise, unnecessary, and involves a lowering of medical standards, and whereas there can be no compromise with its advocates from the medical profession. Resolved, that if opticians must be registered, it should be as opticians and not under the new name of 'optometrists.' That if there must be recognition it should be legal only and not medical, and that the medical profession should not lend its sanction by serving on the "optometry" boards or by taking 'optometry' boards under the supervision of state boards of medical registration."

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Central Midwives Board.

At a meeting of the Central Midwives Board on July 19th, Ellen Briggs was struck off the roll, because being in attendance as a midwife at a confinement, and the baby suffering from inflammation of the eyes, she did not summon medical help in accordance with the rules of the Board. Charlotte Bates was also removed from the roll for a similar offence.

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A Trachoma Institute at Philadelphia.

The Trachoma Institute of Philadelphia was founded on April 27th, for the purpose of giving treatment to immigrants suffering from trachoma, thus offering them a chance of cure instead of immediate deportation. Dr. Aaron Brav is chief of staff, and Dr. B. S. Krisher, Secretary.—*Ophthalmic Record*, July, 1910.

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The de Vincentiis Medals.

The jury charged with awarding the de Vincentiis medals, composed of Dimmer, van Duyse, Grosz, de Lapersonne, Marquez, Scholtz, Snellen, van der Stracten, Blaau, Kublei, and Zia Bey, has made the following awards :—

To Foreign Authors.—Gold medals to.—(1) Thomson Henderson (Nottingham): "The rationale of iridectomy in the treatment of glaucoma: an anatomical, physiological and pathological research." (2) H. Villard (Montpellier): Le lavage de la chambre antérieure dans l'opération de la cataracte." (3) Birch-Hirschfeld (Leipzig): "Die Veränderung der Bindehaut nach häufiges Bestrahlung mit kurzwelligem Licht." (4) R. Seefelder (Leipzig): "Ueber die Entwicklung der physiologischen Exkavation des Sehnerveneintritt beim Menschen." In addition to the foregoing, silver medals were awarded to W. Clausen (Berlin): "Zur ætiologie des Trachoms," and to K. Wessely (Wurzburg): "Ueber den Flussigkeitswechsel des glaskörpers und das Verhalten der Augenflüssigkeiten bei hæmoglobinæmie."

To Italian Authors.—Gold medals to.—(1) A. de Lieto Vollaro: "Nuovi contributi alla conosenza della fine morfologio comparata delle cellule della cornea propria." (2) Guglianetti: "Sulle modificazioni del potere ossidante della retina per azione delle luci monocromatiche spettrali di ugualeintensita, del calore e della cocaina." (3) G. Samperi: "Sui linfatici delle studio e loro vie di deflusso." (4) A. del Monte: "Contributo allo studio della degenerazione amiloide della congiuntiva e delle palpebre, ecc." A silver medal was awarded to R. Pardon: "Sulla reigenerazione del nervo ottico."

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Birmingham Eye Hospital.

Under the will of the late Mr. Thomas Horne, of Warwick, the Birmingham Eye Hospital inherits one third of the residuary estate, the amount it will receive from this source being apparently about £12,000.

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A Touching Incident.

In connection with the recent royal visit to the London Hospital there was a pretty incident in the ophthalmic ward. A little child, nearly blinded by cataract, was held up by one of the sisters, who told her charge that the King and Queen were passing. Queen Mary heard this, made an enquiry, and was told the tiny patient was almost blind. Her Majesty said she must say a word to the child. The sister, seeing the Queen approach, told her patient, "The Queen is coming towards you," and when her Majesty caught hold of the little girl's hand, and the nurse said, "The Queen is shaking hands with you now," the child tried to raise its eyelids to catch a faint shadow of her Majesty, and was supremely happy when she succeeded.

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Professor Fuchs.

As noted in our last number, Dr. Ernst Fuchs, well-known to every ophthalmic surgeon throughout the civilized world, is about to resign the Professorship of Ophthalmology in Vienna. We regret to add that the cause is ill-health.

* * * *

Committee on Colour Blindness.

Objections have been taken by the Imperial Merchant Service Guild to the *personnel* of the Committee on Colour Blindness recently appointed by the Board of Trade. The Guild appears to have just cause for complaint. The Guild complains that the Royal Society is so largely represented upon the Committee, since in the year 1892 that Society advised the Board of Trade that Holmgren's wool tests were adequate for the detection of cases of colour blindness. The Royal Society, practically speaking, is now upon its trial. Another complaint is that it was understood by the Guild that shipping organizations were not to be represented on the Committee. Yet one member of the Committee is secretary of the second largest association of shipowners in the United Kingdom; another is an underwriter; and a third is an Elder Brother of Trinity House. The Imperial Merchant Service Guild is wholly unrepresented. To our mind, however, the most serious objection that can be urged against the composition of the Committee is the failure to include amongst its members the name of Dr. F. W. Edridge-Green, whose advice was thrown on one side by the Board of Trade when that body officially adopted the recommendations of the Royal Society. The omission is indeed a glaring one. It should be met by appointing Dr. Edridge-Green forthwith, and failing that, the subject is one which might well be raised in the House of Commons.

* * * *

Royal College of Surgeons of England.

Mr. Stephen Mayou has consented to undertake the revision of the eye specimens in the Hunterian Museum of the Royal College of Surgeons of England.

* * * *

Refraction Work.

In the United States there are about 3,000 oculists, good, bad and indifferent, mostly the latter; and these would like to serve exclusively 90 millions of people, which is clearly impossible, for on the average one-third of the people have glasses for various purposes. One reason why the optometrists have developed

to their present status has been that there has been an urgent demand for them. Whether there would ever have been this demand had family doctors practised refraction is an unsolvable question. The fact is that, so far, they have not fitted glasses. Efforts are being made, however, by some of the oculists of the country to get general practitioners to take up refraction, and thus make the optometrists unnecessary. It is not likely that this movement will come to anything, for in the first place the family doctor already has as large a burden as he can carry, and in the second place the majority of the oculists are themselves opposed to the plan, for if the family doctor begins to fit simple cases, he will not stop there, but will treat most difficult cases as well, and that would mean practically an end of the oculist as a specialist, at least, so far as fitting glasses is concerned.—*Optical Journal and Review*, August 4th, 1910.

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ORIGINAL COMMUNICATIONS.

THE RELATION OF LIGHT PERCEPTION TO COLOUR PERCEPTION.*

BY

F. W. EDRIDGE-GREEN, M.D., F.R.C.S.,

BEIT MEDICAL RESEARCH FELLOW.

SINCE the majority of the theories of *colour* perception which have been propounded have been really theories of *light* perception, the two subjects namely, colour and light perception, though really quite distinct, have become so interwoven in the discussion of the question that many seem quite incapable of distinguishing the two. Yet it may be easily shown that light perception and colour perception are quite distinct. In fact, we can divide cases of colour blindness into two classes, according as the defect is (*a*) one of light perception, or (*b*) one of colour perception or differentiation without any defect in light perception. Of course, both defects may be present in the same individual.

The investigation of these two classes of defective vision is much facilitated by the use of a spectrometer which I have devised for the purpose, and which is so arranged as to make it possible to expose to view in the eye-piece the portion of a spectrum† between any two desired wave-lengths. It consists of the usual parts of a prism spectroscope, *i.e.*, a collimator with adjustable slit, prism, and telescope with eye-piece of the following dimensions:—

Focal length of collimator and telescope object glasses = $7\frac{1}{8}$ inches (180 mm.).

Clear aperture of collimator and telescope object glasses = $\frac{3}{4}$ inch (22 mm.)

Slit, 7 mm. effective length of jaw, with wedge for reducing the effective length of the slit, protective cap, comparison prism, and screw adjustment for the slit width, with divided head.

The prism is of flint glass, 1·65 refractive index for D. eye-piece, Ramsden form, focussing on to the shutters described below.

In the focal plane of the telescope are two adjustable shutters with vertical edges, the shutters being carried by levers which rotate about centres near the object glass of the telescope. The shutters can be moved into the field from right and left respectively, each by its own micrometer screw, and to each screw is attached a drum, the one being on the right and the other on the left of the telescope. On each of these drums is cut a helical slot in which runs an index, and the drum is engraved in such a manner that the reading of the index gives directly in wave-lengths the position in the spectrum of the corresponding shutter.

Thus it will be seen that if, for instance, the reading on the left drumhead is 5320 and that on the right drumhead is 5950, the region of the spectrum from λ5320 to λ5950 is exposed to view in the eye-piece.

* Paper read before the Royal Society, June 30th, 1910.

† This spectrometer has been constructed for me by Adam Hilger, Ltd., and was purchased with a grant made by the Government Grant Committee of the Royal Society.

The instrument is used as follows.—As far as possible a known quality and intensity of light should be employed. A small oil lamp is quite suitable for the purpose. The observer should first ascertain the exact position of the termination of the red end of the spectrum, the left-hand shutter being moved across until every trace of red just disappears. The position of the pointer on the left-hand drum is noted, and the wave-length recorded. The left drum is then moved so that the shutter is more towards the middle of the spectrum. The right-hand drum is then moved until the pointer indicates the wave-length recorded as termination of the red end of the spectrum. The observer then moves the left-hand shutter in and out until he obtains the largest portion of red which appears absolutely monochromatic to him, no notice being taken of variations in *brightness*, but only in *hue*. The position of the index on the left-hand drum is recorded. The left-hand shutter is then moved more towards the violet end of the spectrum, the right-hand shutter being placed at the position previously occupied by the left-hand shutter. In this way the whole of the spectrum is traversed until the termination of the violet end of the spectrum is finally ascertained with the right-hand shutter. The variation of the size of the patches and the termination of the spectrum with different intensities of light can be noted.

The instrument can also be used for ascertaining the exact position and size of the neutral patches in dichromics, the position of greatest luminosity and the size and extent of pure colours. When it is used to test colour-blindness, the examinee should first be shown some portion of the interior of the spectrum, and then asked to name the various colours which he sees. In this way he will have no clue to the colours which are being shown him.

Tested with this instrument a normal individual will, as a rule, name six distinct colours (viz., red, orange, yellow, green, blue, violet), and will mark out by means of the shutters about 18 monochromatic patches. Occasionally we come across individuals with a greater power of differentiating hues, to whom, as to Newton, there is a distinct colour between the blue and violet, which Newton called indigo. Such individuals will mark out a greater number of monochromatic patches, from 22 up to 29. The limited number of monochromatic patches which can be marked out in this way is at first surprising when we consider how insensibly one part of the spectrum seems to shade into the next when the whole of the spectrum is looked at. The number and position of the patches present, however, great uniformity from one case to another.

I propose to deal with a certain number of cases of defective colour vision as investigated by this instrument, and to show how we may differentiate those defects due to failure of light perception from those due to failure of colour or hue perception.

1.—Defective Light Perception with Normal Colour Perception.

As an illustration of this class I may mention a case I have recently examined in which there was shortening of the red end of the spectrum with absolutely normal hue perception. A boy wishing to enter the Navy had been examined with the Holmgren test and certified to have normal colour perception. He was rejected, however, with the lantern test. He was then sent to me. I found his hue perception quite normal. He matched and named colours with ease and accuracy. When tested with the spectrometer, however, I found that his spectrum for bright light was shortened to λ 700,

the limit for normal individuals being about λ 760 to λ 780. He had also defective perception for the red rays adjacent to the shortened portion. When examined with my lantern (*a*) he failed altogether to see the standard red light No. 2 at about 20 feet distance, though he could clearly see the aperture through which the light came. The bright red light consisting almost exclusively of rays from λ 625 to λ 731 was not even visible to him as light.

In the latest reports of the Board of Trade there are several cases of men who have passed the green test of Holmgren, but have failed with the rose test and have therefore been designated completely red-blind. These cases are probably similar to the boy whose condition I have just described. Such cases are undoubtedly red-blind for the rays which are not seen, but not in the sense of the Young-Helmholtz or Hering theories. This boy was in a similar position to a person who is unable to hear very low notes on an organ. Such persons may have absolutely normal perception of tone differences above a certain number of vibrations per second, and in the same way these cases of so-called red blindness may have a normal appreciation of colour differences for all the spectrum except the least refrangible rays, which do not influence their retinas at all. In the same way, just as certain individuals may be deaf to the highest notes of music, so there is a class of persons whose spectrum is shortened at the violet end. Although such cases will have an appreciation of colour differences as good as that of the average individual, their colour sense will not be identical with the latter.

This will be evident if we consider the influence of a shortened spectrum upon colour vision. The first evident fact is that bodies reflecting only light, the rays of which occupy the missing portion of the spectrum, appear black. Nearly all colours are compound, that is to say, the coloured body reflects other rays than those of the colour seen. Thus a blue-green glass may transmit the green, blue, and violet rays of the spectrum. Let us suppose that we have a substance reflecting the green, blue, and three-quarters of the violet, the colour of the body to a normal person being green. Then if we had another substance which reflected the whole of the violet, it would appear blue. But with a person who could not perceive the terminal fourth of the violet the colour would look exactly the same as the green one, and as he could not distinguish between the two, he would be in continual difficulty with blues and greens. All coloured objects reflecting rays occupying the missing portion appear darker than they do to the normal sighted, and are always matched with darker colours belonging to a point more internal. Thus a dichromic with a shortened red end of the spectrum matches a red with a darker green.

It will be noticed that a shortened spectrum, especially if one end only be affected, may interfere very little with the general appreciation of shade. If, for instance, we take a case in which the red end of the spectrum is shortened, so that only three-quarters of the red of the normal sighted is seen, then all bodies which equally reflect or transmit these rays can be correctly compared, because a similar portion of light has been removed from each. It is only when one colour reflects or transmits the rays occupying the shortened portion and the other does not that there is any definite interference with the appreciation of shade. Again, if neither colour reflects or transmits rays occupying the shortened portion of the spectrum, there will obviously be no interference with the appreciation of shade.

A very common mistake due to shortening of the red end of the

(*a*) This is described in my book on "*Colour Blindness and Colour Perception*" (International Scientific Series), 1909, p. 264

spectrum is the confusion of pink and blue. If a person with considerable shortening of the red end of the spectrum is shown a pink which is made up of a mixture of red and violet, the red consisting of rays occupying the missing portion of the spectrum, only the violet is visible to him, and so the pink appears a violet without a trace of red. This pink is therefore matched with a violet or blue very much darker than itself.

Mistakes which are due to shortening of the spectrum may be remedied if we subtract the rays occupying the missing portion from the colour of confusion. For instance, if we take a blue and a pink which have been put together as identical by a person with a shortened red end of the spectrum, and look at them through a glass which is opaque to the red but transparent to the remaining rays of the spectrum, both will appear alike in hue and shade. A person with considerable shortening of the red end of the spectrum will look at a red light (which is so dazzlingly bright to a normal-sighted person as to make his eyes ache after looking at it closely for a few seconds), at a distance of a few inches, and remark that there is nothing visible, and that the whole is absolutely black. It is obvious that the light must consist only of rays occupying the missing portion of the spectrum.

The same remarks which I have made for a shortened spectrum apply to cases in which there is defect of light perception through absorption or any other cause. The person having the defect is placed in a similar position to a normal-sighted person with those particular rays removed or reduced to the same intensity.

Another effect of shortening of the spectrum when it is sufficient to interfere with the difference perception which appears to be inherent in the central nervous system is that the colours appear to be moved in the direction of the unshortened portion. For instance, we find the neutral point of the dichromic with shortening of the red end of the spectrum further towards the violet end of the spectrum in comparison with a case in which the spectrum is of normal length. In the same way a trichromic with a shortened red end of the spectrum has the junction of the red and green nearer the violet end than in a case where there is no shortening.

The point that I specially wish to emphasise is that, though every case in which there is defective light perception can be explained by a defective sensibility to light of certain wave-length, not a single case of the very large number of persons that I have examined can be explained on the older theories, that is, the defect of light perception cannot be explained on the assumption that there is a defect in a light-perceiving substance which is sensitive to rays of light from a considerable range of the spectrum.

2.—Cases in which there is Defective Colour Perception.

Even in cases where there is actual colour blindness or deficiency of hue perception it is equally important to differentiate between the perception of light and the perception of hue. Let us take as example a case which at first sight appears to be in support of the older theories, a case of so-called red-blindness, in which there is dichromic vision with considerable shortening of the red end of the spectrum. It can be easily shown that the defect which has caused the non-perception of certain red rays has not caused the dichromatism. A case of this kind will put a bright rose with a dark blue, a bright red with a dark green, designate a dark red leather as black, and find difficulty in seeing in a red light. On examining such a case it will be

found that the shortening of the red end of the spectrum may be abrupt or more or less diffuse; that is, there may be defective perception of red over a much larger area. It will, however, be found that the light perception is absolutely normal immediately adjacent to the portion in which there is defective light perception. For instance, the red may be shortened to λ 680; at λ 670 the perception of red may be defective to about half the normal, and at λ 660 it may be quite normal. If we now test such a case with spectral colours from λ 660 onwards to the violet end of the spectrum, we find that their luminosity, *i.e.*, differences of light and shade, is identical with the normal. Thus the subtraction of the element which causes the non-perception of certain rays cannot be responsible for the dichromic vision which extends from λ 660 to λ 385.

In estimating defects of light perception, colours should be directly compared in order to ascertain their comparative luminosity. For instance, light of λ 589 can be compared with light of λ 570 and λ 535. A comparison with white light gives rise to results which are very fallacious. Not only have the missing red rays to be subtracted, but if the individual have a spectrum which is lengthened at the violet end or is more sensitive to any other rays than the normal, a co-efficient corresponding to these rays must be added. Therefore if α represent the missing red rays and β the added violet rays, the formula of white light as seen by the individual in question, as compared with the normal, will be white $= \alpha + \beta$.

Still more difficult to explain on any light perception theory are the cases of so-called green-blindness. These, as I have shown, are simply cases of dichromic vision without shortening of the spectrum, and, indeed, with no defect in light perception in any part of the spectrum. If to such cases we give colours to compare which differ only slightly in shade but are absolutely different in hue, we find that their selection of the lightest or darkest corresponds to that which would be made by a normal individual. A red and a green, or an orange and a green, will be selected which to the normal eye match exactly in shade [a].

During two years I examined every case of colour blindness which came to my notice with Rayleigh's colour mixing apparatus, in addition to other methods. In this apparatus a match is made between λ 589 (sodium yellow) and a mixture of λ 670 (lithium red) and λ 535 (thallium green). The results obtained, however, seem to be quite independent of the power possessed by the individuals examined to appreciate differences in colour. In fact, by this apparatus we may obtain abnormal values in persons who have apparently no defect in hue perception, while others who are undoubtedly colour-blind may give results which correspond to that given by the average individual. The results seem to be determined not by varying power of appreciation of hue, but by slight variations in the luminosity curve of different parts of the spectrum in different individuals. Another important factor, probably the chief one, is the state of adaptation of the eye at the time of the observation.

All who have had practical acquaintance with colour-blindness are aware that all dichromics are not equally colour-blind; one will be readily detected by almost any test, whilst another requires the greatest care to detect at all. I find that the cases of dichromic vision vary from almost total colour-blindness to cases bordering on those I have called the trichromic.

(a) These observations are in agreement with those of A. Kōnig, who also found that there were considerable variations in the luminosity curve of persons of normal colour perception, whilst a so-called green-blind had almost exactly the same curve as himself and a normal sighted woman. '*Beitrage zur Psychologie und Physiologie der Sinnesorgane*,' 1891, p. 311.

I give below the monochromatic patches marked out by four dichromics with my spectrometer in similar conditions. The light was 180 meter-candles, the slit the same size in each, and the eye light-adapted. The size of the patches is measured in micro-millimetres.

Case.	Monochromatic patches. No.	λ	$\mu\mu$.	Remarks.
1	1	665	167	
	2	498	69	Patch of greatest luminosity, λ 571 -608.
		429		Neutral patch, λ 4854 – 5078.
2	1	635	132	
	2	503	9	Neutral patch, λ 4975 5100.
	3	494	12	
	4	482	67	
		415		
3	1	735	130	
	2	605	71	Neutral patch, λ 5005 — 5185.
	3	534	35	
	4	499	7	
	5	492	10	
	6	482	68	
		414		
4	1	775	122	
	2	653	136	Patch of greatest luminosity, λ 587—642.
	3	517	17	
	4	506	12	Largest neutral patch, λ 504—515.
	5	494	10	
	6	484	11	
	7	473	57	No defect of light or shade perception.
		416		I agreed with all his selections.

No. 1 cannot see any difference between the cactus flower and its leaf, and does not see any difference between the red and green signal lights except at the moment when there is a change from one to the other. It is obvious that this case is much more colour-blind than the ordinary dichromic. On the other hand, a case bordering on the trichromic will see about eight definite patches in the spectrum; make a normal match with Rayleigh's apparatus; pass the Holmgren test with ease; and play pool regularly without on any occasion mistaking the coloured balls. Such a case, when examined with the spectrometer, has eight monochromatic patches instead of the normal eighteen; says that there are only two colours in the spectrum, red and violet, and has a very small neutral patch. It is quite easy to show that such a case is dichromic, as he will match spectral blue-green with a mixture of spectral red and violet: $\lambda\ 670 + \lambda\ 470 = \lambda\ 490$. How could a defect in a light-perceiving substance have such varying results? If we assume that in these cases there is a varying perception of colour difference, the facts are explained.

It is stated in favour of the Young-Helmholtz theory that with three variables we can produce innumerable variations, the fact that on trial we can only perceive a limited number of variations in the spectrum being entirely ignored. The same argument would, however, apply to a two-colour theory, since we can make innumerable variations with only two variables.

A more important argument, however, against the three-colour theory is to be found in the fact that there is a whole group of cases which possess three definite colour sensations and yet are undoubtedly colour blind. These I have called the class of trichromics. Such persons may match the Holmgren wools perfectly, though they may make mistakes in *naming* single wools. A very frequent mistake when shown a single skein of yellow wool is to call it red or green, while a blue wool they will call green or violet. Similar mistakes are made with a lantern. When examined with the spectrometer, they will name only three colours as against the six named by an ordinary individual. When questioned, they regard the application of a special name of yellow or blue to definite parts of the spectrum as word-splitting, and would regard the words reddish-green or greenish-violet as more appropriate to the parts of the spectrum in question.

I give below the details of three trichromic cases as examined by the spectrometer.

MONOCHROMATIC PATCHES IN WAVE-LENGTHS AS MARKED OUT BY TRICHROMICS 1, 2 AND 3.

No. of patches.	Case 1.		Case 2.		Case 3.	
	λ.	δλ.	λ.	δλ.	λ.	δλ.
1	7341 6160	1181	7604 6149	1455	7604 6105	1499
2	6037 5877	160	6050 5877	173	6032 5877	155
3	5873 5677	196	5883 5694	189	5877 5765	112
4	5679 5408	271	5694 5453	241	5765 5660	105
5	5411 5309	102	5446 5166	280	5660 5529	131
6	5309 5178	131	5166 4991	175	5529 5323	206
7	5176 5070	106	4991 4916	75	5326 5024	302
8	5070 4969	101	4921 4855	66	5024 4855	169
9	4972 4806	166	4850 4713	137	4850 4713	137
10	4811 4019	792	4713 3853	860	4713 3853	860
	Length of spectrum, 3322 Ångstrom units.		Length of spectrum, 3751 Ångstrom units.		Length of spectrum, 3751 Ångstrom units.	

δλ represents the size of the monochromatic patch in Ångstrom units.

On comparing these three cases, it will be noted that there is a series of very remarkable coincidences. Each presents 10 monochromatic patches, and in each there are two wide patches at the extremities and one in the centre. It will be noticed also that the smaller patches are grouped round this central one. In 1 and 3 there are in each case five intermediate patches on one side and two on the other, but in 1 the five patches are on the violet side and in 3 on the red side.

As far as these intermediate regions are concerned, 3 looks like a reversal of 1. No. 2 has four patches on one side and three on the other. There are also coincidences in the wave-lengths. The first two patches on the violet side in 2 and 3 are exactly alike in size and position. All three coincide at λ 5877. Nos. 2 and 3 have a spectrum of normal length and of exactly the same size, whilst 1 has a spectrum which is shortened at both ends but more shortened on the red side. The centre of the smallest patch of 1 is λ 5543, and the centres of 2 and 3 λ 5306 and λ 5174 respectively. It would appear as if these were three similar cases with different absorption.

We know that the portions of the spectrum which differ are those which are most influenced by the varying pigmentation of the yellow spot. It will be noticed that the total effect is the same, the spectrum being divided into 10 patches in each case, so that what is gained on one side is lost on the other. No. 2 is the spectrum of Sir J. J. Thomson, further details of whose colour perception I have given in the "Proceedings of the Royal Society," B, vol. 76, 1905, p. 194. Sir J. J. Thomson, when making the match previously mentioned with Rayleigh's apparatus, put more green than the normal in the mixed colour, but the other two trichromics made the normal match. It is obvious that this alteration in light perception could not produce the defect in colour perception which was found.

By the use of the spectrometer described above, it is easy to detect cases of defective colour perception of a smaller degree than the two classes I have described. In fact, if we regard the normal individual as hexachromic, we can differentiate classes possessing five and four colour sensations respectively, which may be called pentachromic and tetrachromic. In these cases, the only loss is the power of differentiation of hue. The sensibility to light, *i.e.*, to luminosity, may be normal throughout the whole spectrum These minor cases will, as a rule, match wools perfectly, but may make slight mistakes when asked to name the colours of single skeins. The pentachromic may be regarded as differentiating the colours red, yellow, green, blue, violet, while the tetrachromic would name only the colours red, yellow, green, violet. It is evident that none of these classes can be explained by assuming the absence of any substance or set of percipient elements sensitive to light over a considerable area of the spectrum. Any theory of colour vision must explain the position of the colours and the varying size of the monochromatic patches in each case.

A CASE OF MICROPHTHALMOS; WITH REMARKS.*

BY

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THE case of microphthalmos here reported, showed, in addition to some well-known malformations, certain abnormalities which have not, so far as I know, been described. In the following paper this case will be taken as a text, and an endeavour will be made to amplify the observations and elucidate the points at issue by the quotation of other instances of malformation which have fallen under my notice.

For the specimen I am indebted to Dr. Hood, formerly House Physician to the General Lying-in Hospital, York Road. It was derived from a malformed child which lived six days after birth. The left pinna was badly formed, and the auditory meatus was imperforate; there was a large gap in the centre of the upper lip (absence of the premaxilla), and the palate was cleft; the nasal bones were defective: supernumerary fingers were present on the hands, and the left little toe was bifurcated. The child was jaundiced, suffered from cyanotic attacks and stopped breathing at times. Mother's age, 33, six previous pregnancies, no miscarriages, no congenital abnormalities in any of the other children; deliveries uncomplicated; the present child was born in the right occipito-posterior position.

Both eyes were microphthalmic. The corneæ were clear; an irregular rim of iris was visible on the nasal side, and a white mass was present behind the cornea below; an exact examination was difficult. After the death of the child Dr. Hood kindly allowed me to excise the left eye. It measured antero-posteriorly 10·5 mm., vertically 10·5 mm., transversely 11 mm. The cornea measured 6·5 mm. transversely, 5·5 mm. vertically. The globe was externally well formed. It was fixed in Zenker's solution and cut in horizontal serial sections.

In general terms the lesions were as follows. A large strand of persistent mesoblast ran from beneath the papilla through the vitreous downwards and outwards to the ciliary body and sclero-corneal junction; at its point of insertion there was a coloboma of the ciliary body and iris, and the iris was also defectively developed elsewhere. The lens was anchored to the mesoblastic strand, and by the growth of the eye had become displaced downwards, carrying with it the inner layer of the secondary optic vesicle in a fold which had undergone enormous cystic distension (see below p. 713). Over an extensive area of the cornea the pupillary membrane had failed to separate. A more detailed account of these conditions is subjoined.

The curvature of the cornea differs but little from that of the sclera (Fig. 15). It is slightly thinner in the centre than in the periphery. The epithelium is normal; the membrane of Bowman is present and well developed in the centre, but stops sooner than usual at the sides. The stroma contains a few small vessels mostly derived from the sclero-corneal margin, partly from the adherent pupillary membrane; otherwise the structure is that of a normal child's cornea. Where the pupillary membrane is not adherent the membrane of Descemet and endothelium are normal (Fig. 5).

The condition of the iris and its relations to the lens are shown in Fig. 1, which is a reconstruction to scale.† On the nasal side it is fairly well formed; above, below, and on the temporal side reduced to a rudiment. Taking first a section through the iris at its broadest part, one finds that it is very well developed (Fig. 2). The stroma has the usual loose arrangement; it contains vessels, but is devoid of pigment except for some clump cells derived from the pigment epithelium. A well-formed sphincter is present, and is pigmented. The two layers of the pigment epithelium are separated by a narrow space; both are fully charged with pigment. At the corneo-iridic angle the membrane of Descemet ends in the normal position, in a well-developed ligamentum pectinatum. The canal of Schlemm seems to be wholly absent on this side.

The corneo-iridic angle itself is not normally developed, but is filled in by a loose tissue with elongated meshes, which much resembles the ligamentum pectinatum, and is continuous with that structure on the one hand, and with the anterior surface of the root of the iris on the other (better seen in Fig. 4). From the posterior layer of this loose tissue fibres stretch out over the anterior surface of

* From the Hunterian Lectures delivered in the Royal College of Surgeons, March, 1910.

† The diagram does not represent the amount of iris projecting into the anterior chamber, but the larger measurement from the anterior insertion of the ciliary muscle to the pupillary border of the sphincter, these two being the best fixed points available. The photographs give a better idea of what would have been the clinical appearance.

A CASE OF MICROPHTHALMOS WITH REMARKS.

BY

GEORGE COATS, M.D., F.R.C.S.

FIG. 1.

Fig. 1. Reconstruction to scale showing the relations of the iris, lens, etc., viewed from in front.

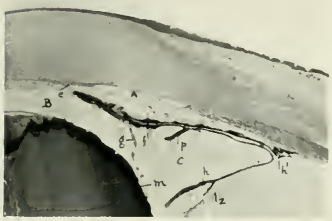

FIG. 2.

Fig. 2. Section at the site of best development of the iris on the nasal side. A. Anterior chamber. B. Anterior division of posterior chamber (see p. 714). C. Posterior division of the posterior chamber. e. Fibrous tissue connecting the pupillary border of the iris with the back of the cornea. To the left of this point there is no anterior chamber, the cornea and pupillary membrane being undifferentiated from one another. f. Iris. g. Vascular strand passing forward from the fibro-vascular capsule of the lens to the back of the iris; it clothes the inner third of the posterior surface of the iris and runs into the fibrous tissue (e) h, h^1 The ciliary processes. The inner layer of the optic vesicle does not follow the plications of the outer, but is drawn out into a long fold; the mesoblast and outer layer of the vesicle (h^1) are represented by some low excrescences. The processes are displaced backwards relative to the ciliary muscle (see p. 712). p. Minor plications of the inner layer of the optic vesicle. m. Lens. z. Zonula.

FIG. 3.

Fig. 3. A section higher on the nasal side, where the iris is less developed. The iris is shorter and is connected with the cornea by a fibrous strand (e)—the persistent pupillary membrane. The anterior ending of the optic vesicle is bowed forwards. Lettering as in Fig. 2.

FIG. 4.

Fig. 4. High power view of the least developed iris of the nasal side. It is reduced to a small stump, and the optic vesicle, where it comes in contact with the fibrovascular strand (g), has been prevented from growing in and turns sharply forwards. The corneo iridic angle is imperfectly formed and is filled in with a loose tissue which is continued on to the anterior surface of the iris and into the pupillary membrane (e), as a sheet of tissue with elongated meshes (r). s. Sphincter. Other lettering as in Fig. 2.

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the iris in close contact with, and frequently adherent to its stroma, but yet on the whole distinguishable as a separate membrane; at the pupillary border they become compacted into a denser fibrous tissue which effects an adhesion, containing vessels, between the iris and the back of the cornea (Fig. 2e). The adhesion is reinforced from behind by a sheet of vascular fibrous tissue which represents the fibro-vascular sheath of the lens (g); it comes from the lens equator, which is here displaced to the opposite side, passes forward to the iris, clothes its inner third, and passes round the pupillary border to join with the fibrous tissue in front in forming the adhesion to the cornea. Vessels are thus supplied to the adhesion and to the cornea through it, both from the iris and from the fibro-vascular sheath of the lens. Between the site of the adhesion and the corneo-iridic angle an anterior chamber is present (a) and there is a normal membrane of Descemet and endothelium (see Fig. 5); at the site of adhesion they cease abruptly, and from this point to the corresponding adhesion of the iris or pupillary membrane on the opposite side, the anterior chamber is absent, there is no membrane of Descemet, and the posterior surface of the cornea is not lined with endothelium. In other words the pupillary membrane has failed to differentiate from the cornea.

Proceeding upwards towards a region where development is less perfect, the pupillary border of the iris is found to recede from the cornea (Fig 3). The ligamentum pectinatum, the loose tissue in the corneo-iridic angle, and the membrane on the anterior surface of the iris have still the same structure and relations, but now the space between the pupillary border and the cornea is bridged by a long thin sheet of vascular fibrous tissue, which is continuous with the membrane on the iris (Fig. 3); this corresponds of course, with a persistent pupillary membrane. The vascular tissue derived from the fibro-vascular capsule of the lens (g) still skirts the inner part of the posterior surface of the iris and passes round the pupillary border, but it is now inserted not into the adhesion to the cornea, but into the periphery of the pupillary membrane. The pupillary membrane is not quite complete, but in some sections shows gaps both in its continuity and in its insertion into the iris, so that the anterior chamber is not entirely shut off from the posterior.

In the upper part of the globe the iris becomes dwarfed to a small stump, and has the appearance of having its pupillary border folded forward (Fig. 4) the optic vesicle turns sharply forward and the anterior surface of the sphincter (s) faces outwards; there is however no actual groove in the anterior surface. Here, as elsewhere, the structure of the stroma is normal. The distinction between the stroma and the membrane on its surface (r) is well seen in Fig. 4.

Turning now to the site of least development, on the inner side and below, the iris is found to be in a very rudimentary condition. (Fig. 6.) It is represented by a little triangular mass of tissue resembling in structure the normal iris stroma; it is for the most part loosely adherent to the sclero-cornea by means of a tissue with elongated meshes similar to that which lines the anterior surface and fills in the corneo-iridic angle in other positions. In the upper outer part of the globe a distinction may be made between the iris tissue and the pupillary membrane proper, which runs off from it, and is inserted into the cornea as on the other side: in this situation, therefore, there is a small anterior chamber which is in communication with the posterior chamber through some small gaps in the pupillary membrane. Below, on the other hand, this distinction cannot be maintained, the iris and pupillary membrane are undifferentiated, and the anterior chamber is represented by some cleft-like spaces where the adhesion of the iris is imperfect. The secondary optic vesicle ends on this side in a little complex of folds; it is interesting and important to observe that a small distorted sphincter has been developed in connection with its anterior termination (Fig. 6). Here as elsewhere mesoblast runs forward from the fibro-vascular capsule, passes round the end of the optic vesicle, and is inserted into the mesoblast of the iris (Fig. 6). On this side the membrane of Descemet is present in places, the ligamentum pectinatum is well developed, and in many of the sections a canal of Schlemm is found.

The ciliary processes are peculiar both in position and structure (Figs. 2 & 3, h, h^1). Their situation is probably nearly normal as measured from the anterior end of the optic vesicle, but corresponding with the dwarfed condition of the iris, is considerably further back than normal relative to the anterior end of the ciliary muscle. They arise approximately at the middle of the ciliary muscle instead of at its anterior end. Structurally there is a peculiar independence of the two layers of the optic vesicle. The mesoblastic portion of the processes (h^1) is represented by a number of low, wart-like excrescences which are closely lined by the outer layer of the vesicle. The inner layer of the vesicle on the other hand does not follow the surface irregularities, but is represented by a long simple fold stretching out towards the equator of the lens; in some sections it gives off small secondary folds, and in most it branches at its extremity into one or two little divisions. (Fig. 3). The anterior layer of the fold is deeply pigmented, the posterior much less so; in some sections indeed it loses its pigment near the base of the fold. From this lightly pigmented posterior layer, and from the apex, abundant zonular fibres (z) arise, and spreading out in a fan-shaped manner, are inserted into the equator of the lens: in places a few zonular fibres arise from the anterior layer. Where the iris is least developed the mesoblastic excrescences and plications of the outer layer of the vesicle are absent, the ciliary processes being represented by a fold of the inner layer alone. (Fig. 4p). A few smaller duplications of the inner layer of the vesicle are also present elsewhere. Except in the coloboma below, the ciliary muscle is everywhere well developed. It commonly shows a little distortion, its innermost fibres having an appearance of being slightly displaced forwards.

Where the mesoblastic strand, to be described presently, is inserted into the sclero-corneal junction there is a gap in the iris and ciliary body. The defect in the ciliary body (Fig 7) is broad, the muscle ceasing some distance out on each side, but approaching more closely on the temporal. On the nasal side the ciliary body ends in a tuft of ciliary processes (h) which have the usual double lining of epithelium, and, though partially divorced from the muscle, are better developed here than anywhere else in the globe. This corresponds with an observation by Bock*, who found that the ciliary

* "Die angeborenen Kolobome d. Augapfels." Figs. 19, 21. Wien, 1893.

processes lining a coloboma are usually larger then anywhere else, perhaps because they are better nourished in the neighbourhood of the persistent mesoblast. On the temporal side of the strand the optic vesicle ends partly in a similar, less developed tuft of ciliary processes, partly in a simple backward fold.

The insertion of the strand does not reach so far back as the ora serrata, so that the posterior portion of the ciliary body is not colobomatous. Anteriorly, it stretches some distance forwards beyond the ciliary body, and in this area the iris is completely absent. Owing to its insertion towards the temporal side the strand has interfered with the development of the iris temporally much more than nasally.

Before proceeding with the description of the globe it will be convenient to consider the points already raised.

The case has an important bearing on the subject of congenital anterior staphyloma. It fulfils all the demands of those who maintain that that condition is due to mal-development, not to the perforation of an intrauterine corneal ulcer; over an extensive area—more than two-thirds of its extent—the cornea has not separated from the mesoblast behind, and the anterior chamber has not formed. Yet the case in no way resembles one of congenital anterior staphyloma; the cornea was clear, there was no loss of substance either from the deep or superficial layers, and in its microscopical structure it departed very little from the normal. There could scarcely be stronger evidence that congenital anterior staphyloma is not due to mal-development, but to corneal perforation. A very similar case has recently been recorded by Mr. Mayou.*

The case also proves that failure of differentiation in the anterior part of the eye does not result in the fusion of a fully developed iris with the cornea—the condition found in congenital anterior staphyloma—but in the fusion of the pupillary membrane with the cornea. This is only what might be expected, since the cleavage which forms the anterior chamber is not between cornea and iris, but between cornea and pupillary membrane (Fig. 8), the ingrowth of the iris being a later phenomenon. In the present instance, wherever the iris has grown in, it is not adherent, and wherever it is adherent, it has not grown in.

The congenital abnormalities so far described are four in number:—

(1) An anterior synechia of the pupillary membrane.

(2) A fibrous membrane on the anterior surface of the iris, continuous with the pupillary membrane.

(3) A mal-development of the iris.

(4) A rudimentary condition and backward displacement of the ciliary processes.

Anterior Synechia of the Pupillary Membrane.

Of this, little need be said, as the subject has been recently discussed by Ballantyne.† The condition is usually seen in the form of a number of pigmented threads arising, often by many radicles, from the circulus minor, and passing across the anterior chamber to be inserted into the cornea; before joining the cornea the fibres often break up again into a number of filaments, and at the site of insertion there is a deep-seated grey or punctiform opacity; sometimes there is a plaque of corneal opacity into which all the fibres are inserted, or a more diffuse nebula. The anterior chamber is of normal depth where crossed by the filaments, and the dilatation of the pupil is not interfered with. Occasionally an anterior polar cataract is present.

There can be no doubt that this condition may arise from the perforation of an ulcer. In many of the recorded cases there has been a history of

* *Trans. Ophth. Soc.*, Vol. XXX, p. 120, 1910, Abstract in THE OPHTHALMOSCOPE, September, 1910.
† *Trans. Ophth. Soc.*, Vol. XXV, p. 319, 1905.

ophthalmia neonatorum,* and in Wintersteiner's case† the entanglement in a recent perforation was actually observed microscopically. That the pupillary membrane may disappear not before, but some time after birth is proved by the following figures:—In newly-born children, Königstein‡ found it present twenty-one times in 3,000 cases, Schleich§ 13 times in 150 cases; in adults Uhthoff¶ found it six times in 10,000 cases, Mooren** 14 times in over 100,000 cases. It is evident, therefore, that if a perforating ulcer occurs within a short time of birth, the pupillary membrane must be caught up fairly frequently. No doubt in most cases it subsequently disappears in the usual manner, but in some instances the vascular demands of the healing ulcer, and the communication of the vessels of the membrane with those of the cicatrix, may cause its persistence. On these grounds, therefore, there was a tendency at one time to explain all cases of anterior synechia of the pupillary membrane as being due to a perforation in early childhood; the fact that in many cases the cornea was almost clear was explained by the great capacity for regeneration which the infant's cornea undoubtedly possesses.

It has been shown, however, that this explanation is insufficient to cover all the cases. Even among the earlier records there were many instances in which no history of ophthalmia neonatorum or other cause of ulceration could be obtained,†† and in which the cornea was perfectly smooth and clear, except for a minute opacity in the deepest layers, where the membrane was inserted. It was sought to explain some of these by a fœtal or post-natal keratitis or kerato-iritis, causing anterior synechia without perforation, the process being aided, perhaps, by the shallowness of the anterior chamber in the fœtus and young child. But this is certainly a very exceptional sequence of keratitis, recorded however by Schweigger,‡‡ and in these cases of anterior synechia of the pupillary membrane signs of iritis are conspicuously absent. The occurrence of the condition as a true malformation was proved by Treacher Collins,§§ who found it associated with persistent hyaloid artery, the cornea being quite clear and microscopically normal, and by v. Hippel,¶¶ who described it in a microphthalmic eye, containing many other abnormalities; where the strand was inserted the membrane of Descemet was absent. An instance which Mr. Collins described in the eye of a cat was also undoubtedly a pure malformation, and Mr. Mayou's case, already referred to, falls into the same category. The present case is another very good instance belonging to this group.

Congenital anterior synechia of the pupillary membrane is therefore a condition which may originate in two ways (1) from the perforation of a corneal ulcer, and (2) as a pure malformation.

* Beck, quoted in Arlt's Krankheiten d. Auges, Bd. I., p. 234, 1854. I do not know where Beck's paper is to be found; Arlt's reference is incorrect, but he quotes fully. Samelsohn, A. *Centralbl. f. prakt. Augenh.* Bd. IV. p. 215, 1880; v. Duyse *Arch. d'Opht.* T. XXII. p. 237, 1902; Gesang, B. Deutschmann's *Beitr. z. Augenh.* Bd. VI. Hft. 60, p. 836, 1904.

† *Arch. f. Ophth.* Bd. LVII, S. 53, 1903.

‡ Quoted by v. Duyse *Encyclop. Française d'Opht.*, p. 378, 1905.

§ I have been unable to find the original reference to these two authors. Quoted by v. Duyse.

¶ *Jahresbericht d. Schoeler's Augenklinik.*, 1882. Quoted by v. Duyse.

** "Fünf Lustren ophthalmologischer Wirksamkeit.," S. 30, 1882.

†† Makrocki, F., *Arch. f. Augenh.*, Bd. XIV., S. 83, 1885, Zirm, E., *Klin. Monatsbl. f. Augenh.*, Bd. XXVIII, S. 288, 1890, Trattner, A., *Klin. Monatsbl. f. Augenh.*, Bd. XXIX, S. 331, 1891, Vossius, A., *Deutschmann's Beitr. z. Augenh.*, Bd. I, Hft. 9, S. 9, 1893, Wüstefeld, F., *Zeitsch. f. Augenh.* Bd. IV, S. 590, 1900.

‡‡ *Arch. f. Augenh.*, Bd. XVII, S. 403, 1887.

§§ "Researches into the Anatomy and Pathology of the Eye," London, 1896, p. 101.

¶¶ *Arch. f. Ophth.*, Bd. LX., S. 444, 1905.

Fibrous Membrane on the Iris.

In the microscopical description I spoke of a long-meshed membrane lying on the anterior surface of the iris and continuous on the one hand with the loose tissue in the corneo-iridic angle, and on the other with the pupillary membrane (p. 702); it frequently adheres to the iris stroma, but is, on the whole, a distinguishable structure (Fig. 41). It is probably formed, when the optic vesicle and the adjacent deep layers of the mesoblast grow in to form the iris, by the persistence of some of the superficial mesoblastic layers which do not take part in the development of the iris stroma. Should this membrane persist it is possible that it gives rise to a very rare abnormality in which a crescentic sheet of bluish white fibrous tissue with a tendinous sheen covers part of the anterior surface of the iris. The membrane may partially cover the pupil, which is displaced towards the side on which it occurs; the part of the pupil which is uncovered may re-act vigorously. So far as I know the only case in literature is one shown at the Ophthalmological Society by Mr. Sydney Stephenson*, who well describes the appearance as follows:—"The impression conveyed to my mind is that it (the membrane) overlies the iris, and that if it could be removed iris tissue would be found behind it. A point in favour of this assumption is that at the extreme periphery a narrow zone of what seems to be iris can be recognised". An exactly similar case was shown me once at Moorfields by Mr. W. T. Holmes Spicer.

Against the explanation here given it should be mentioned that microscopically the fibrous tissue was continuous with the pupillary membrane, whereas clinically the tendinous character of the sheet differs entirely from the appearance produced by persistence of that structure Further investigations are evidently required, but unless it be a layer separated off from the cornea I know of no other structure from which a membrane lying on the anterior surface of the iris could be derived.

Aniridia and Coloboma of the Iris.

The iris in this case showed the clinical appearance of a partial aniridia. What light does the microscopical examination throw on the pathogenesis of that condition and its close relative, coloboma of the iris? That these two are intimately allied is shown by several considerations. (1) Clinically the difference is of degree rather than of kind, and from recorded cases a graduated series could easily be constructed under the descriptive terms, ordinary key-hole coloboma, coloboma of unusual size and shape, partial aniridia with good development of the iris in one sector, partial aniridia with no more than a small rim in any direction, and finally complete aniridia; these remarks hold good especially for atypical coloboma. (2) There are cases in which coloboma has been present in one eye, and partial aniridia in the other.† (3) From the pathological point of view the lesions are much the same; in both cases a small stump of iris is almost always present, though concealed under the sclero-corneal margin. For the purpose of discussion the two may be taken together.

It is impossible in this place to enter into an analysis of all the theories of aniridia and coloboma; of aniridia alone I have counted no fewer than fifteen different explanations. All those which are worthy of consideration, however, presume an obstacle to the ingrowth of the iris from the periphery

*(*Trans. Ophth. Soc.*, Vol. XXVIII. p. 212, 1908.)

†Kindfleisch, *Arch. f. Ophth.*, Bd. XXXVIII., i., S. 183, 1892. Foster, *Arch. f. Augenh.*, Bd. XXXIX., S. 106, 1899.

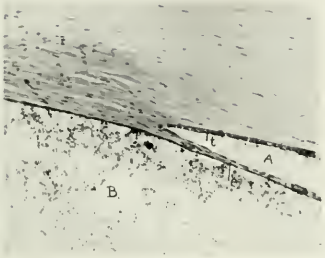

FIG. 5.

Fig. 5. Junction of the persistent pupillary membrane with the cornea. A. Anterior chamber which is lined with a well-formed membrane of Descemet (t) and endothelium. e. The pupillary membrane. A vessel is seen near its junction with the cornea. To the left of its point of junction there is no anterior chamber, and the membrane of Descemet and endothelium cease abruptly. B. Anterior division of the posterior chamber.

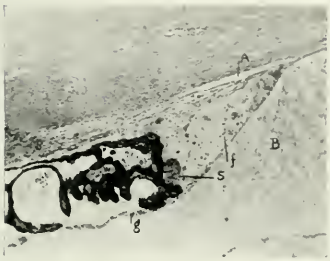

FIG. 6.

Fig. 6. The iris stump on the temporal side. It shows the triangular form which is common in aniridia, and is partially adherent to the cornea the line of separation being indicated by a cleft (A). s. Sphincter. g. Mesoblast passing from behind round the end of the optic vesicle.

FIG. 7.

Fig. 7. Coloboma of the ciliary body due to the insertion of the mesoblastic strand which replaces the anterior part of the vitreous; a large plaque of hyalin cartilage is seen below. m. Lens adherent to the mesoblast. h. Hypertrophied ciliary processes by the side of the coloboma. v. Ciliary muscle.

FIG. 8.

Fig. 8. Normal fœtal corneo-iridic angle about the third month. To illustrate the state of affairs before the ingrowth of the iris. A. Anterior chamber, which separates the cornea, not from the iris, but from the pupillary membrane (e). g. The fibrovascular sheath of the lens. According to the hypothesis of Hess, it is the undue development of a strand of this tissue which prevents the ingrowth of the iris in aniridia and coloboma (Cf. g. in Figs. 2, 3, 4, 9, 10, 11). o. Secondary optic vesicle not yet grown in to form the posterior lining of the iris. m. Lens.

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which normally occurs at the fourth month. Some authors suppose the hindrance to affect primarily the mesoblast, others the anterior edge of the optic vesicle ; there can be no doubt, however, that these two structures are independent only in the most restricted degree—the optic vesicle may fall slightly short of the termination of the mesoblast or may overlap it a little, both these conditions being actually found pathologically*—but in the main anything which prevents the ingrowth of the one will do the same for the other.

As to the nature of the hindrance in aniridia, the following four hypotheses may be considered :—(1) Hypothesis of Manz. That during development the lens remains unduly long in contact with the cornea, and so hinders the iris from growing in. (2) That the mesoblast fails to separate properly into cornea and iris, so that the iris is never differentiated, and cannot grow inwards.† (3) Hypothesis of Treacher Collins. That the fibro-vascular sheath remains adherent to the anterior lens capsule and so prevents the ingrowth of the iris (see foot-note). 4. Hypothesis of Hess. In normal circumstances the mesoblast of the fibro-vascular sheath passes round the anterior edge of the secondary optic vesicle and becomes continuous with the mesoblast from which the iris is to develop, and from which the pupillary membrane springs (Fig. 8). Should this tissue, or a strand of it connected with some particular vessel, be unusually dense and unyielding, both the optic vesicle and the mesoblast which should form the iris will be prevented from growing inwards, and aniridia or a coloboma will result. It is not mere persistence of the mesoblast which prevents the ingrowth of the iris, since even normally it persists till late in fœtal life ; but in ordinary development it yields to the growing iris and follows it inwards over the lens.

My own researches strongly support the truth of this last hypothesis. In the present case of microphthalmos the association of the strand of fibrovascular sheath with the defective development of the iris is obvious. It is present in all the sections ; on the nasal side although it has persisted, it has yielded and allowed the iris to grow in (Fig. 2) ; elsewhere it has permitted a a certain amount of ingrowth, after which the optic vesicle, unable to proceed further inwards, has turned forwards, and a dwarfed iris has been produced, (Figs. 3, 4) ; elsewhere again the ingrowth of the optic vesicle has been practically wholly prevented, and the iris is reduced to an insignificant stump adherent to the sclero-cornea (Fig. 6).

In another specimen which I possess the same association of aniridia with persistent strands of the fibro-vascular sheath was present. Figures 9 to 12 are derived from a case of cyclopia which I owe to the kindness of Lieut.-Col. H. Herbert, I.M.S.

The scleral and choroidal partition between the two eyes has disappeared, the retinæ of the inner side of each are partially fused, and the optic nerve is single. In other respects the globes are distinguishable ; there are two corneæ separated by a strip of sclera, two irides, ciliary bodies, lenses, vitreous chambers and papillæ. The corneæ are normal except that a few small vessels are present in the stroma ; the membranes of Bowman and Descemet, and the endothelium are well developed.

* Bock ("Die angeborenen Kolobome d. Augapfels." Cases I, II, III, and XVII. Figs. 14-17. Wien, 1893) describes several instances in which a gap was present in the pigment epithelium of the iris while the mesoblast was intact.

† This hypothesis is assigned by v. Hippel (Graefe Saemisch *Handbuch d. gesamten Augenh.* 2te Auflage. Bd. II. Kap. IX. p. 58, 1900) to Treacher Collins. I cannot find that Mr. Collins has anywhere attributed aniridia to such a lack of separation, apart from forward displacement of the lens as in the hypothesis of Manz. In a personal communication he writes : "I have thought from the examination of my specimens of aniridia and coloboma of the iris that a mechanical obstruction to the growth in of the iris may arise from (a) adhesion or prolonged apposition of the lens and cornea" (*i.e.*, hypothesis of Manz) ; (b) "adhesion of anterior fibro-vascular sheath to lens capsule ; (c) adhesion of prolongation of posterior fibro-vascular sheath round side of lens to the cornea" (*i.e.*, hypothesis of Hess).

The irides are represented by a small stump which does not reach beyond the level of the limbus, so that, had the condition been visible it would have presented the clinical characters of an aniridia. The shape of the iris stump varies in different places; most commonly it has the form of a triangle pointed towards the interior of the globe (Fig. 9); in places the apex is rounded owing to the stroma being turned backwards round the end of the optic vesicle (Fig. 11). The pupillary membrane is persistent and contains vessels; it is given off from the apex of the iris, the origin from a membrane on its anterior surface not being so evident in this as in the last case. Several large gaps occur both in the continuity of the membrane and at its insertion into the iris.

As in the last case many vessels run forward from the fibro-vascular sheath of the lens, pass round the end of the secondary optic vesicle and are inserted into the mesoblast in front, at the root of the pupillary membrane (g). The vessels occur only here and there in the present instance, not as an almost continuous sheet The part which they play in preventing the ingrowth of the optic vesicle is especially well shown on the nasal side of one of the eyes (Fig. 10). Here large strands containing vessels (g) pass forward to the sclero-corneal junction; the iris has totally failed to grow in, the mesoblast whence it should have sprung forms nothing more than a little thickened pad on the posterior surface of the cornea, from which the pupillary membrane arises (e).

The corneo-iridic angle is very imperfectly formed. The ligamentum pectinatum has mostly failed to differentiate from the sclera, and where it is distinguishable it is much condensed, and obviously impervious. The canal of Schlemm is totally absent. The iris has not separated out to its root, though the line of cleavage is indicated in some sections by longitudinal clefts bridged across by strands.

Microscopically the stroma is fairly normal where a stump is present. The sphincter is usually completely absent, but in places a few cells resembling muscle fibres are found in association with the termination of the optic vesicle. The two layers of the optic vesicle have not come together on the iris or ciliary body, so that the cavity of the primary vesicle remains open. The anterior layer is, in places, thrown into small plications on the iris: the posterior passes off independently into the interior of the globe towards the equator of the lens. The condition of the ciliary body will be described in another connection (p. 712).

The lenses are considerably displaced backwards. The vascular network of the fibro-vascular sheath surrounds them except on their anterior surface, where the portion of it which is represented by the pupillary membrane, has remained forward in its normal position, and is separated from the lens by a considerable interval. It is interesting to note that the lens is capable of this kind of displacement within its vascular capsule. The inner layer of the optic vesicle, partly represented by unpigmented epithelium, partly by retina, adheres to the equator of the lens, being separated from its proper capsule only by the fibro-vascular sheath.

A strand of mesoblast containing vessels and cartilage is present in each vitreous. The other changes in the posterior part of the globe have been partly described by me elsewhere (THE OPHTHALMOSCOPE, Vol. VII., p. 724, 1909), and do not concern us at present.

It will be seen that the hypothesis of Hess receives strong support from these two cases. In both vascular strands connected the mesoblast behind, with that in front of, the optic vesicle, and prevented the ingrowth of the latter. A study of the details of recorded instances of aniridia and coloboma reveals other evidence of the same nature.

(1) In literature there are several instances, similar to my microphthalmic case, in which large strands of persistent mesoblast have run from the papilla to the equator of the lens, and passing round it have been inserted at the sclero corneal junction* The hyaloid artery is not a single vessel; as it crosses the vitreous it breaks up into a number of twigs, some of which run into the fibro-vascular sheath quite at the equator of the lens. The undue development and persistence of one or more of these lateral branches with its surrounding mesoblast would produce a strand of the type here described. An ophthalmoscopic picture which probably depends on the persistence of a strand of this kind, is that in which a broad band or sheet of fibrous tissue, containing vessels, passes from the papilla through the vitreous to be inserted into the ciliary region.† In Eversbusch's case‡ such a strand was continued round the

* Ecker, quoted by Manz, Graefe—Saemisch, *Handbuch d. gesamt. Augenh.*, 1 Auflage, Bd. II, S. 76, 1876. Hess, C., *Arch. f. Ophth.*, Bd. XXXIV, Hft. 3, S. 147, 1888. Bach, L., *Arch. f. Oph.*, Bd. XLV, S. 1, cases 2 and 3, 1898. Dötsch, A., *Arch. f. Oph.*, Bd. XLVIII, S. 59, 1899. Saltiner, O., *Arch. f. Ophth.*, Bd. LIV, S. 552, 1902. de Vries, W. M., *Arch. f. Ophth.*, Bd. LVII, S. 544, 1904.

† Bayer, *Prager mediz. Wochensch.*, Bd. VI, S. 342, 1881. Quoted by de Beck, D. "Persist. Remains of fœtal hyaloid Artery," p. 54, 1890. Wilbrand, H., *Jahrbücher d. Hamburgischen Staatskrankenanstalten*, Bd. I, S. 430, Taf. XI, 1889. Eason, H. L., *Trans. Ophth. Soc.*, Vol. XXIV, p. 324, 1904.

‡ *Ber. d. Ophth. Gesellsch. Heidelberg*, Bd. XV, S. 168, 1883.

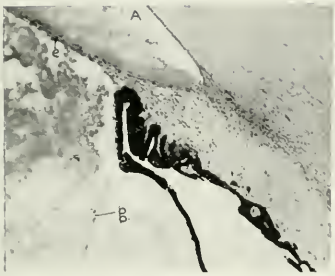

FIG. 9.

Fig. 9. Aniridia from the case of Cyclops (see p. 707). The stump is triangular in form, and no sphincter is visible. The two layers of the optic vesicle are separated by a space. A. Anterior chamber. e. Persistent pupillary membrane, not adherent to the cornea. g. Strand running forward from the fibrovascular capsule of the lens.

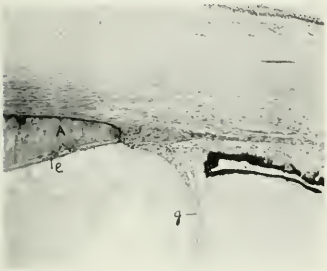

FIG. 10.

Fig. 10. From the same case. The iris is here much more rudimentary, being represented only by a thickened pad of mesoblast into which a large vascular strand from the fibrovascular capsule runs from behind (g) and from which the pupillary membrane (e) takes origin.

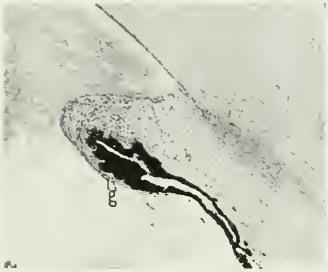

FIG. 11.

Fig. 11. From the same case. To show the folding back of the mesoblast (g) round the end of the optic vesicle, which is not uncommon in aniridia and coloboma stumps (see p. 709).

FIG. 15.

Fig. 15. General view of the globe. A. Anterior chamber. B. Anterior division of the posterior chamber. C. Posterior division of the posterior chamber, almost completely filling the globe. D Vitreous, much shrunken. The mesoblastic strand is not cut at this level. k. Sheet of inner layer of the optic vesicle which has undergone distension. It lines the choroid on the nasal side and crushes the nasal retina over to the temporal side. l. Nasal retina. P. Temporal retina. m. Lens.

To face page 708

equator of the lens and ended in the apex of a coloboma of the iris. In an instance which I had the opportunity of examining the strand was on the temporal side; all the retinal arteries seemed to be contained in it, the retina elsewhere showing veins with their usual distribution, but without accompanying arteries.

(2). Even when no mesoblastic strand is found, its former presence is often suggested by the shape of the iris stump. Very frequently it is described as having the form of a triangle with its apex directed towards the interior of the globe, the anterior free side consisting of iris stroma, and the posterior of pigment epithelium.*

This form is well shown in Fig. 6, in which, it will be noticed, the sphincter is at the apex of the triangle, in close association with the end of the optic vesicle. The position of the sphincter, and the general shape of the stump suggest retraction rather than a frustrated attempt to grow in between the cornea and lens vesicle, such as is supposed by the theory of Manz. Moreover this theory is disproved in my case of cyclopia by the fact that the lens, so far from being forward against the cornea, was displaced backwards into the vitreous; inasmuch as the ingrowth of the iris is a late phenomenon in fœtal life, occurring at a date when the displacement must have already taken place, the lens cannot have hindered it in this instance.

If on the other hand lack of differentiation were the only obstacle to the ingrowth of the iris the sphincter might rather be expected near that angle of the triangle which is inserted into the cornea. The theory of imperfect differentiation also fails to account for those cases in which the corneo-iridic angle is normally formed. The frequency with which pathological examinations of aniridia have been conducted on eyes excised for glaucoma has probably caused an exaggerated estimate to be formed of the commonness of occlusion of the corneo-iridic angle; it should always be remembered that not all eyes affected with aniridia become glaucomatous, and that some of them, obtained *post mortem*, have shown an open angle.† On examining Figs. 4, 9, and 11, it will be seen that the iris stump *has* freed itself from the cornea; it was at liberty to grow in if it had not been hindered by the presence of the mesoblastic strand. That the corneo-iridic angle frequently developes imperfectly is true, and this is the probable cause of the occurrence of glaucoma in eyes with aniridia, but it is not the cause of the failure of ingrowth on the part of the iris.

In neither of my cases was there an adhesion between the fibro-vascular sheath and the anterior lens capsule (hypothesis of Collins). On the contrary both of them show that the connection of the lens with its fibro-vascular sheath is loose, and that the lens is capable of being considerably displaced, leaving the anterior portion of the sheath behind it, either adherent to the cornea (case 1), or in its normal position (case 2).

Another structural peculiarity of the iris stump which is common in recorded cases of aniridia and coloboma,‡ and which is favourable to the theory of Hess, is shown in Fig. 11. This backward folding of the iris mesoblast round the termination of the optic vesicle is best explained either as being a persistent portion of a strand from the fibro-vascular sheath, or as being due to the retraction of the iris stroma by a strand of this nature which has since disappeared. It is inconsistent with the theory of non-differentiation of iris

*In aniridia.—Collins, E. T., *Ophth. Rev*, Vol. X. p. 101, 1891. Pagenstecher, A. H., *Arch. f. Ophth.*, Bd. LV. S. 75, 1903. Bergmeister, R., *Arch. f. Ophth.*, Bd. LIX. S. 31, 1904, v. Duyse. *Arch. d'Opht.*, T. XXVII. S. 1, 1907.

†In aniridia.—v. Duyse, *Arch. d'Opht.* T. XXVII, p. 1, 1907. In coloboma.—Seefelder, R., *Arch. f. Ophth.* Bd. LXVIII, S. 242 (250), 1908.

‡Bock E., "Die angeborenen Kolobome d. Augapfels," Fig. 18 Wien, 1893.

and cornea, and inasmuch as the optic vesicle does not necessarily share in the retroflexion (Fig. 11), it is not so well explained, on the theory of Manz, as a folding back of the ingrowing iris where it meets with the adherent lens.

In recorded cases, apart from the persistence of large strands, it is not uncommon to find a small quantity of fibrous tissue on the posterior surface of the iris stump or at the apex of the coloboma.* This is strong evidence in favour of the theory of Hess. Another common structural character of similar significance is this, that the ciliary processes are frequently bent backwards as if, during development, they had been retracted or hindered from growing forward by a strand on their inner aspect.†

Persistence of various parts of the fibrovascular sheath is also not uncommonly associated with aniridia and coloboma.‡

(3) The theory of Hess gives the best explanation of atypical coloboma of the iris. It is well known that atypical coloboma, although not so common as typical, occurs more frequently in the iris than in any other part of the uveal tract. According to the theory of Hess, the reason for this is that in early fœtal life mesoblast passes in between the lens vesicle and the optic vesicle, not only in the line of the fœtal cleft, but in every other direction. In other words, the fibro-vascular sheath, which is mostly derived from this mesoblast, is present all round and not only below. It is evident that a strand may be unduly developed and may hinder the ingrowth of the vesicle in any direction, although naturally that direction will usually be below, since more mesoblast enters in the line of the cleft than elsewhere, and since it is in the line of the cleft that mesoblast usually developes atypically further back. The persistence of mesoblast in two directions explains without difficulty the rare occurrence of two colobomata in one iris,§ and of atypical coloboma of the iris with typical of the choroid.‖ The first of these two conditions especially is inexplicable on the theory of Manz; it is almost inconceivable that the lens should be in contact with the cornea in two distinct places at once.

(4) The theory of Hess has the advantage of bringing a large number of abnormalities under one common explanation. By the persistence of various parts of the fibro-vascular sheath, the following may be supposed to originate:—Persistence of the pupillary membrane, aniridia, coloboma of the iris, coloboma and ectopia of the lens, persistent hyaloid artery and posterior polar cataract. With regard to coloboma and ectopia of the lens, conditions which seem to have a closely similar or indeed identical pathogenesis, there are two possibilities: (a) the mesoblastic strand passing round the equator of the lens may persist long enough to interfere with the formation of the zonula, but yet may disappear very early in fœtal life. In this case the lens will be attached to the ciliary body by a well-formed zonula, except in the former position of the strand—usually below—and in the growth of the eye it will be gradually carried over to the opposite side; in addition, the

* Holden, W. A., *Arch. of Ophth.*, Vol. XXI. p. 499. 1892. Bock, E., "Die angeborenen Kolobome d. Augapfels." 1893. Case 2. Pagenstecher, A. H., *Arch. f. Ophth.* Bd. LV., S. 75. 1903. Seefelder, R., *Arch. f. Ophth.*, Bd. LXVIII., S. 242 (250). 1908.

† De Benedetti, A., *Ann. di. Ottalm. Anno.* XV. pp. 184 (198) & 399. 1886. Rindfleisch, G., *Arch. f Ophth.*, Bd. XXXVII 3. S. 192 1891. Pagenstecher, A. H., *Arch. f. Ophth.*, Bd., LV., S. 75 1903.

‡ In aniridia—De Benedetti, *Ann. di Ottalm. Anno.* XV. pp. 184 (198) & 399. 1886. Collins, E. T., "Researches into the Anat. & Path. of the Eye," Lond. 1896, p. 97. Bergmeister, R., *Arch. f. Ophth.*, Bd, LIX, S. 31 1904. v. Duyse, *Arch. d'Opht*, T. XXVII p. 1. 1907.

In coloboma—Bock, E., "Die angeborenen Kolobome d. Aagapfels." Case IV 1893.

§ Bock, E., "Die angeborenen Kolobome d. Augapfels." Cases XII, XIII and XXVIII, Wien, 1893. Other cases are also quoted by Bock (p. 83).

‖ Mittelstadt, *Arch. f. Augenh.*, Bd. IX, S. 423, 1880. Hess, C., *Klin. Monatsbl. f. Augenh.*, p. 100, 1892.

equator of the lens may be actually compressed or pushed over to the other side by the persistent strand. This accounts for the ordinary upward dislocation and inferior coloboma of the lens, and dislocations in other directions may be explained by the persistence of strands in other directions. (b) If the mesoblastic strand persists till late in fœtal life, or permanently, the lens may remain anchored to it. In this case the eye will grow away from the lens and leave it fixed to the ciliary body in the direction of the strand—usually below. This appearance is perhaps more often seen in sections than clinically, since it usually occurs in very small, much-malformed eyes. It was present in my case of microphthalmos, and is perhaps the cause of some cases of downward ectopia and upward coloboma of the lens. The association of coloboma of the lens with mesoblastic strands rests on something more than speculation; in a case described by Baas* a strand of fibrous tissue passed from the circulus minor of the iris on the nasal side to the equator of the lens, which it invaginated; in a microphthalmic eye described by Vossius† the lens was kidney shaped, and in the hilum, which was directed towards the nasal side, there was a quantity of fibrous tissue.

(5) The theory of Hess not only accounts for the abnormalities mentioned above, but also offers the best explanation of their association with one another. The association of pupillary membrane with coloboma of the iris‡ and of various abnormalties with persistent hyaloid artery, etc., may be accidental, but the occurrence of atypical coloboma of the iris with coloboma of the lens in the same direction§ or ectopia in the opposite direction must signify a common etiology, which lies ready to hand in persistence of the fibro-vascular capsule.

(6) The undue persistence of mesoblast is a well-known cause of the great majority of congenital abnormalities of the eye, and it is in favour of the theory of Hess that it uses for the explanation of aniridia this firmly-established factor rather than a hypothetical failure of the separation of the cornea and lens.

(7). The theory of Hess applies the same explanation to aniridia, partial aniridia, coloboma, and atypical coloboma. It has already been shown that from the clinical point of view there are many gradations between these conditions. On the theory of non-differentiation they might be accounted for by supposing that the failure in separation of the cornea and iris may occur in any direction, and may be partial or complete, but while this would account for aniridia and coloboma taken by themselves, it offers no explanation of their association with coloboma and ectopia of the lens, an association which is probably as common in aniridia as it is in coloboma of the iris. Manz's theory of aniridia is scarcely applicable to coloboma. It is conceivable indeed that a localised contact of the lens with the cornea might hinder the ingrowth of a sector of the iris, but to suppose that this is the cause of ordinary typical coloboma is to exclude the influence of the fœtal cleft, and to nullify the significance of the frequent association with typical coloboma of the choroid. Moreover, as mentioned above, the theory can scarcely be used to explain the presence of two colobomata in a single iris; it is not easy to suppose that the lens may be in contact with the cornea in two distinct places. Manz's theory of coloboma therefore differs from his theory of aniridia; he attributes the former to a failure in the closure of the anterior part of the

*_Klin. Monatsbl. f. Augenh._, Bd. XXXI., S. 297. 1893.

†_Deutschmann's, Beitr. z. Augenh._, Bd. IX., 1893.

‡A number of cases are cited by Bock, "Die Angeborenen Kolobome, etc." p. 85.

§Hess, C., _Klin. Monatsbl. f. Augenh._, Bd. XXX., S. 106. Lang, W., _Trans. Ophth. Soc._, Vol. X., p. 106, 1890, etc.

fœtal cleft, in consequence of which the anterior part of the optic vesicle and the mesoblast fail to grow forward. This would account well for typical, but not for atypical coloboma; Hess's theory furnishes an explanation of the failure of ingrowth which is applicable to any direction.

On all these grounds, therefore, I believe that the theory of Hess is the best which has yet been advanced.

Backward Displacement of the Ciliary Processes.

The backward displacement of the ciliary processes which is present in this eye is a peculiar and interesting abnormality, which has not, so far as I know, been described. In the cyclopic eye mentioned above a condition almost exactly similar was found. (Fig. 12.)

The ciliary muscle has developed normally on the temporal sides of the two globes, badly on the nasal. The ciliary processes have developed in something like their normal position as measured from the anterior end of the optic vesicle, but abnormally far back in relation to the muscle (Fig. 12). On the temporal side of one of the eyes they are formed only of mesoblast and the outer layer of the vesicle; in consequence of the separation of the two layers (p. 708), the inner layer of the vesicle passes over the apex of the processes without becoming plicated. On the nasal side of both eyes the ciliary processes are represented by a number of small wart-like excresences of the mesoblast and outer layer of the vesicle; the inner layer is completely detached and takes no part in their formation. In one eye a strand of mesoblast is inserted into the ciliary body below in the form of a small pyramidal mass, which causes a gap in the optic vesicle. The muscle is intact beneath it.

The condition in this eye differed from that found in the microphthalmic globe only in this, that the inner layer of the vesicle was more independent and passed inwards towards the equator of the lens without sharing in the plication of the outer; the backward displacement of the ciliary processes relative to the muscle was entirely similar. The cause was evidently the same in both cases. The strands of fibro-vascular capsule passing forward from the lens prevented the optic vesicle and mesoblast from growing forwards, and in consequence that portion of them from which the ciliary processes originate was displaced backwards.

The condition is an excellent example of the fact that in the developing eye the ciliary muscle and the parts of the ciliary body internal to it are relatively independent, and are capable of displacement upon one another. It is interesting to note that displacement in the opposite direction may also occur. In a case of congenital anterior staphyloma which I had the opportunity of examining,* in consequence of the gradual stretching of the pseudo-cornea and dragging forward of the iris, the inner layers of the ciliary body had been so far displaced forward that the processes were in front of the ending of the membrane of Descemet, the pars plana was on a level with the ligamentum pectinatum, and the ora serrata was in front of the ciliary muscle.

Proceeding with the microscopical examination of the microphthalmic eye, it is found that the persistent mesoblastic strand in the vitreous springs not from the papilla, but from the retina, some distance below it; the actual distance is, no doubt, somewhat exaggerated by the distortion, to be mentioned presently, which the retina and papilla have undergone. The strand is supplied by the largest of the branches into which the central artery breaks. Posteriorly it shows the usual characters of a persistent hyaloid artery; in the centre there is a single large vessel with a well-developed muscular wall; this is surrounded by a layer of loose gelatinous connective tissue which is lost within the retina, not traceable, as is usual, into connection with the fibrous tissue surrounding the central vessels; the outer sheath is formed of denser, more cellular tissue, which becomes continuous with the inner layers of the retina.

In the anterior part of the vitreous the artery becomes surrounded by a large mass of dense cellular fibrous tissue, and breaks up freely into branches. The fibrous mass completely replaces the vitreous anteriorly and passes in a downward and outward direction to be attached to the ciliary body

* Coats, G., OPHTHALMOSCOPE, Vol. VIII, p. 248, 1910. Lawson, A. & Coats, G., *Trans. Ophth. Soc.*, Vol. XXVI. p. 36, 1906).

and sclero-corneal margin; the posterior part of its insertion corresponds with a coloboma of the ciliary body, the muscle being split, and the optic vesicle turning back to form a partial lining for the strand (Fig. 7). The position and extent of the insertion into the sclero-corneal margin are shown in Fig. 1; the sclera in this situation shows little alteration, but contains small vessels, which no doubt take part in the supply of the strand and constitute its venous outflow. At the junction of the strand with the sclera there is a large plaque of hyalin cartilage (Fig. 7).

The lens is firmly adherent to the fibrous tissue in the vitreous (Fig. 7, 13, and 14 [m]). On its lower and outer aspects it is partially embedded in the main mass of the mesoblast. In other directions it is surrounded by a network of vessels—the fibro-vascular sheath—which is connected with, and supplied from, the mesoblastic strand. Anteriorly, however, owing to the non-separation of the fibro-vascular sheath from the cornea, there are no vessels in close contact with the lens capsule. The manner in which strands pass from the fibro-vascular sheath at the equator of the lens to the pupillary border of the iris has already been described (p. 703). The lens is shrunken, and its fibres are breaking down: where it is in contact with the mesoblast the capsule is wrinkled, and there are thick deposits of capsular cataract. As is common in shrunken lenses, the epithelium has spread almost completely round the capsule.

The temporal equator of the lens, being buried in mesoblast, has no zonula connected with it. The fan-shaped collection of fibres which passes from the ciliary processes to the nasal equator has already been described (p. 703). Zonular fibres also arise from the lens capsule further back, and form a confused network which has no connection with the inner layer of the optic vesicle.

Cystic Dilatation of the Posterior Chamber.

The combined consequences of the displacement of the lens and of the malformations in the anterior part of the eye were very curious, and resulted in an abnormality which has not, I believe, been described (Figs. 13 and 14). The lens, although now shrunken and displaced, was presumably, at an early period of fœtal life, of full size and in its normal position in close contact all round with the anterior part of the inner layer of the optic vesicle. As the eye grew larger, however, the lens remained firmly bound down below and to the outer side, by the persistent mesoblastic strand in the vitreous. The growth of the globe therefore produced a dislocation downwards and outwards, and a gradually increasing space was formed upwards and inwards between the lens equator and the ciliary body. In places, however, the attachment of the optic vesicle to the lens equator did not give way, and, in consequence, the inner layer of the vesicle became pulled out into long plications or processes such as are shown in Figs. 2, 3 and 4. In most situations the attachment of the optic vesicle to the equator of the lens was not direct, but by means of the zonula. Elsewhere, however, the adhesion of the vesicle to the lens was direct, so that an extensive sheet of epithelium bridged the space and the ora serrata, sharing in the displacement, was bound down to the mesoblast surrounding the lens (Fig. 13).

So far we are dealing with an abnormality which is rare indeed, but authenticated by several recorded instances.* In the eye now under consideration, however, further complications were added by the fact that the drainage of aqueous was imperfect. The corneo-iridic angle itself was badly developed, and in addition the anterior chamber was almost entirely shut off from the posterior by the adhesion of the iris and pupillary membrane to the cornea; the only communication between the two was by some inconsiderable slits in the pupillary membrane. The extensive sheets of mesoblast which ran forward from the fibro-vascular sheath to the pupillary border constituted a further obstacle to the free circulation of the aqueous. The anterior part of the eye was, in fact, divided into three compartments, communicating only very imperfectly with one another: (1) the anterior chamber bounded by the

* Hess, C., *Arch. f. Ophth.*, Bd. XXXVIII, 3 S. 93, 1892: Collins, E. T., *Roy. Lond. Ophth. Hosp. Rep.*, Vol. XIII, p. 81, 1893; Dötsch, *Arch. f. Ophth.*, Bd. XLVIII, S. 59, 1899; Ginsberg, S., *Arch. f. Ophth.*, Bd. XLVIII, S. 92, 1899; de Vries, W. M., *Arch. f. Ophth.*, Bd. LVII, S. 544, 1903. The duplications may or may not contain mesoblast.

cornea, iris, and pupillary membrane running forward to become adherent to the cornea (Figs. 2, 3, 13, 14 and 15 A); (2) a chamber bounded anteriorly by the undifferentiated cornea and pupillary membrane, laterally by the strands of mesoblast running forward from the fibro-vascular sheath, posteriorly by the lens (Figs. 13, 14, 15 B), partly shown in Figs. 2 and 3 B; (3) a chamber bounded anteriorly and to the outer side by the iris and ciliary body; on the inner side by the strands running forward from the fibro-vascular sheath to the pupillary border; posteriorly by the sheet of epithelium, derived from the inner layer of the secondary optic vesicle, which has just been described as passing across to be attached to the equator of the lens (Fig. 13 C.) Inasmuch as the anterior part of the vitreous was entirely converted into fibrous tissue, no interchange of fluid was possible between it and the aqueous.

In consequence of these various obstacles to the free circulation and drainage of fluid, the aqueous accumulated within a system of loculi (Fig. 13, A. B. C.) which was bounded in front and at the sides by the external tunics of the eye, posteriorly by the lens, and by the sheet of epithelium stretching from its equator to the ciliary body on the nasal side. All these structures were sufficiently strong to resist distension excepting only the sheet of epithelium, which gave way and became ballooned out posteriorly into the sub-retinal space in the manner shown in Fig. 14; this occurred the more easily from the shrinkage of the anterior part of the vitreous. The conditions actually found were the result of the enormous distension of this pouch of epithelium, which finally almost completely filled the globe (Fig. 15 C). By the thrusting of the pouch into the sub-retinal space, the retina of the same side was stripped from the choroid as far back as the papilla, and crushed over on to the retina of the opposite side, such remains of the vitreous as were present posteriorly being much compressed in the process. Where the mesoblastic strand ran through the vitreous, the retina could not be quite so much pushed over, but it was brought into the closest contact and adhesion with the strand in its anterior part, and was thrust into all the inequalities on its surface.

The actual condition of affairs is best described by following the inner layer of the optic vesicle—the layer which had given way (Figs. 14 & 15) On the posterior surface of the iris it is a little separated from the outer layer, but otherwise normal. On the ciliary body it is thrown into a number of plications, some of which represent the drawn-out inner lining of the ciliary processes, while others are simply due to dragging on the zonula. Passing backwards, it forms a continuous epithelial lining to the choroid (Figs. 14, 15, 16, k) on the nasal side; the choroid is here lined both with a pigmented and an unpigmented layer. At the nasal side of the nerve entrance stripping was checked by the firm attachment of the retina to the nerve; the epithelium, therefore, mounts on to the external aspect of the retina formerly belonging to the nasal side, but now crushed over to the temporal. It lines the whole of this aspect, and then passes off in the form of a fold to clothe the posterior surface of the lens nearly as far as the nasal equator—the site of its original attachment in early fœtal life. If the anterior of the two layers of the fold be traced back, it is at first in close contact with the posterior layer, both together being crushed up against the posterior aspect of the lens; presently, however, at a point varying in different sections from the equator to the posterior pole of the lens, the anterior layer separates from the posterior and becomes continuous with the displaced retina of the nasal side.

Only after this long journey, therefore, has the nasal ora serrata been reached (Figs 13 and 14, u). and the whole expanse of epithelium which has

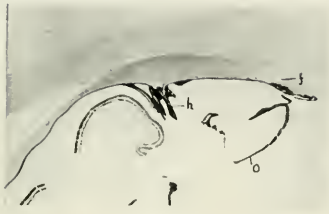

FIG. 12.

Fig. 12. Backward displacement of the ciliary processes. From the case of Cyclops (p 712). The processes arise at about the normal distance from the anterior end of the optic vesicle, but far back relative to the muscle. f. Iris stump. h. Ciliary processes. They are lined only by the outer layer of the vesicle; the inner (o) runs off independently, towards the equator of the lens.

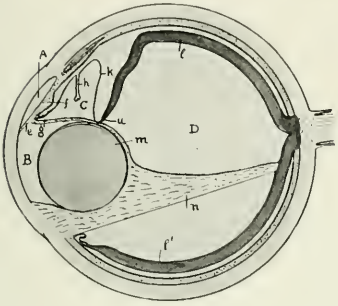

FIG. 13.

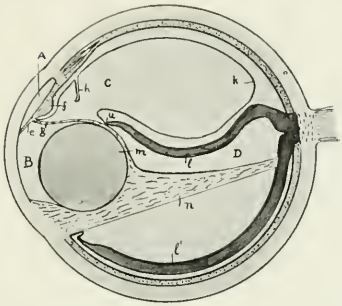

FIG. 14.

Figs 13 & 14. Diagrammatic view of the causation of cystic dilatation of the posterior chamber (see p. 713). Fig. 13 shows the lens (m) anchored to the mesoblastic strand (n) and displaced downwards and to the temporal side. In its displacement it has carried over a sheet of the inner layer of the optic vesicle (k), so that the aqueous is confined within a loculated space (A, B, C,) bounded anteriorly and at the sides by the external tunics of the eye, posteriorly by the sheet (k), and the lens. Fig. 14 shows how the sheet (k) has given way, and has become pushed out into the subretinal space, stripping the retina from the choroid, and thrusting it over to the opposite side. A. Anterior chamber. B. Anterior division of the posterior chamber. C. Posterior division of the posterior chamber. D. Vitreous. e. Pupillary membrane. f. Iris. g. Strand running forward from the fibrovascular sheath. h. Ciliary processes. k. Sheet of inner layer of optic vesicle which undergoes distension. l. Retina of the nasal side. l'. Retina of the temporal side. m. Lens. n. Persistent mesoblastic strand in the vitreous. u. Ora serrata.

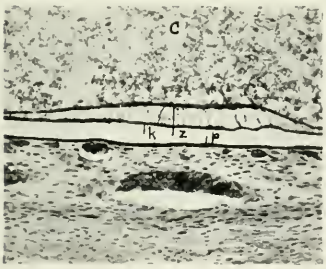

FIG. 16.

Fig. 16. Higher power view of the distended sheet of the inner layer of the optic vesicle, lining the choroid on the nasal side C. Posterior division of the posterior chamber. p. Pigment epithelium. k. Unpigmented epithelium (inner layer of the secondary optic vesicle). z. Zonula.

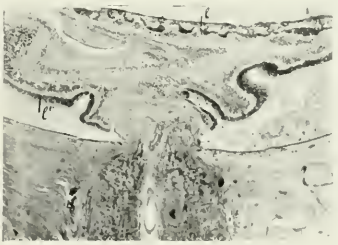

FIG. 17.

Fig. 17. The papilla. l. Retina of the nasal side crushed over on to the temporal retina (l'), and very poorly developed as compared with it.

To face page 714

been travelled over represents nothing but the unpigmented epithelium of the ciliary body. This fact is confirmed in a very curious and striking manner. Normally the unpigmented epithelium is the structure with which the zonula is connected, and from which, according to one view, it is derived. In the pars plana of the ciliary body it has normally the appearance of a strand composed of a system of parallel fibres, which lies a short distance inwards from the epithelium, and is connected with it by a criss-cross arrangement of fibrils. In the present case this appearance is exactly reproduced by the epithelium which lines the choroid and the outer aspect of the displaced nasal retina (Fig. 16). For the most part the zonula forms an even layer on the inner aspect of the epithelium, but in places some fibres run forwards across the cavity of the cyst towards the lens. It is doubtful if any of them reach their destination.

It is evident that if the views here expressed are correct the interior of the globe is really filled with a cystic expansion of the posterior chamber, which should, therefore, contain aqueous (Figs. 13 & 14). This is the case; the cavity is filled with a granular coagulum similar to that which is present in the anterior chamber, and to that which is found generally in eyes fixed in Zenker's solution when the aqueous is slightly more albuminous than normal. The granular composition of this coagulum makes it easily distinguishable from the fibrillar structure of the vitreous, especially in this eye in which the vitreous is so much condensed.

To complete the description of structures not yet mentioned, the retina on the nasal side has suffered severely through being stripped off from the chorio-capillaris early in fœtal life (Fig. 17). It is very irregular in thickness and in places has become almost completely atrophied. Where it is better preserved all the layers are distinguishable, but are much scattered and confused. The inner layers (nerve fibre, ganglion cell, inner reticular and inner nuclear) are more continuous than the outer which are frequently interrupted. The rosette-like rings and spaces, so commonly found in congenitally abnormal eyes, are of frequent occurrence; they consist of the outer nuclear layer, the limitans externa and the rods and cones, the last in a rudimentary state of development. Such rosettes are much more irregular in size and larger than the well-known glioma rosettes, and are also more evidently composed of mal-developed pieces of retina. On the temporal side, apart from some slight irregularities of its layers, the retina is well-developed, except in its most anterior portion, where the nuclear layers become scattered, and rosettes are found. Vessels are present in the retina on both sides. The fovea is quite well formed.

The manner in which the nasal retina was crushed over is well exhibited in Fig. 17, which shows the condition of affairs at the papilla. The retina of the temporal side is seen on the left, the ill-developed nasal retina above. The papilla itself was much more distorted than would appear from this picture; it was not greatly altered laterally, but was much pushed downwards by the pressure from above of the pouch. This is only evident on examining the series of horizontal sections; as was mentioned above, it exaggerated the distance between the origin of the hyaloid artery and the centre of the nerve entrance.

The optic nerve is partially atrophied. The choroid is normal and shows no coloboma.

Two structural peculiarities have not been mentioned in the foregoing account because I have already described and discussed them in another

place (THE OPHTHALMOSCOPE, Vol. VII, 1909, p. 724), namely, the replacement of portions of the pars ciliaris retinæ by pigment epithelium and by rudimentary retina.

Summary.

The conditions present in this globe were as follows :—

(1) *An anterior synechia of the pupillary membrane and iris.* An instance is furnished of the occurrence of this lesion as a pure abnormality and not as the result of a corneal perforation. It is shown that the appearances produced are not those of congenital opacity or anterior staphyloma of the cornea.

(2) *A membrane on the surface of the iris* continuous with the pupillary membrane. It is suggested that this condition may give rise to a rare abnormality—fibrous membrane on the iris.

(3) *An iris which was imperfectly developed* in consequence of

(4) *Persistence of the fibro-vascular sheath of the lens.* These two observations have a bearing on the subjects of aniridia and coloboma of the iris, and tend to support the views of Hess on the pathogenesis of these affections. In support of the same hypothesis, another case of mal-development of the iris was described, certain recorded cases were quoted, and some theoretical considerations were adduced.

(5) *Backward displacement of the ciliary processes relative to the ciliary muscle.*—This abnormality results from the comparative independence in the fœtal eye of the ciliary muscle, and of the structures internal to it, so that a hindrance to the ingrowth of the iris causes the ciliary processes to be displaced backwards, while the ciliary muscle remains in position. A similar displacement in the opposite direction occurs when the iris is dragged forward, as in congenital anterior staphyloma.

(6) *Persistence of a mesoblastic strand in the vitreous.*—It runs not to the posterior pole of the lens, but to its equator below and to the temporal side. It is inserted into the sclero-corneal junction, where it causes

(7) *A coloboma of the ciliary body and iris.*

(8) *Dislocation of the lens downwards and outwards* in consequence of its remaining anchored to the persistent strand.

(9) *Cystic dilatation of the posterior chamber.* This abnormality, which has not hitherto been described, results from the adhesion to the equator of the lens, of a sheet of the inner layer of the optic vesicle, and its subsequent backward protrusion into the subretinal space in consequence of the accumulation of aqueous on its anterior aspect

(10) *Replacement of the unpigmented epithelium of the ciliary body (a) by pigmented epithelium, and (b) by embryonic retina.* This abnormality has been described in another paper (THE OPHTHALMOSCOPE, Vol. VII, 1909, p. 724).

CLINICAL MEMORANDUM

THE EFFECT OF FUMES OF DI-METHYL SULPHATE ON THE EYE.

BY

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AND

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In the light of P. Erdmann's experimental investigations into the effects produced by the fumes of di-methyl sulphate on the eye (abstracted in THE OPHTHALMOSCOPE, August, 1909, p. 578), the case here described occurring in actual practice is of interest.

E. G. I. H., *æt.* 35 years, a chemist, working in the University Chemical Laboratory, came to one of us (P. H. A.) on July 20th, 1909, with the following history.—Three weeks ago he had been exposed to and had inhaled the fumes of di-methyl sulphate which he was using in the course of some experiments. Four hours later, his eyes began to water, but he continued his work. The same evening his eyes became red and painful and poured with water, and they kept him awake all night. His nose, also, was stopped up and running that evening, and next morning he noticed that his sense of smell and taste had gone. These slowly returned, but his eyes remained irritable and watery with some photophobia. His temperature was 100° F. continuously for the first two days and then became normal.

On examination, the margins of the lids were reddened and the ocular conjunctiva in the palpebral aperture much injected and considerably œdematous. The palpebral conjunctiva was practically normal in both eyes, and the corneal epithelium was sound. Very deep in, or on the back of the right cornea, were numerous fine dots, some circular, some rather triangular in shape, scattered chiefly over the centre and lower part of the cornea, *i.e.*, the part exposed in the palpebral aperture.

In the left eye there were six similar dots. The lenses were clear; there were no vitreous opacities; and nothing abnormal was seen in the fundi. Vision was unaffected. I put him on to atropin (gr. 1) drops with boric lotion and ointment, and seven days later, when I saw him again, the dots were diminishing in number and size and the eyes were quieter. There was still some injection of the ocular conjunctiva on either side of the corneæ.

He was now leaving Oxford for Staffordshire, so I referred him to Mr. Bernard Cridland, who saw him a fortnight later and has kindly sent me these notes:—

"On examination, there was only slight congestion of the ocular conjunctiva in the palpebral aperture. Lids normal. Corneæ clear. Pupils evenly dilated. Nothing abnormal in fundus except ? ? right disc rather pale on the temporal side. Fields showed some general contraction. Atropin omitted. Pil. strych. gr. $\frac{1}{32}$. *b. d.* ordered. Four weeks later, both eyes quiet. Optic nerves doubtfully pale. Fields of vision improved, showing only very slight contraction. Central colour vision good."

I saw the patient again three months later. The eyes were perfectly quiet, the fields of vision practically full, with no appreciable pallor of the discs.

Remarks.—It will thus be seen that this case agrees very closely with the condition experimentally produced by Erdmann, except that no permanent

haze of the cornea persisted and no disturbance of the corneal epithelium was observed, although it may have passed off before we saw him. The loss of the sense of taste and smell, which persisted longer than the running from the nose, together with the slight temporary contraction of the visual fields, as observed by Mr. Cridland, presumably indicating some slight affection of the cranial nerves, is also of interest.

Di-methyl sulphate is a liquid which can be distilled with liberation of a volatile acid.

A CASE OF SUPERFICIAL PUNCTATE KERATITIS CAUSED BY EXCESSIVE USE OF EYEDROPS.

BY

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JUNIOR HON. ASST. OPHTHALMIC SURGEON, SYDNEY HOSPITAL, N.S.W.

THE patient, W. C——, aged 49 years, had occasion to consult an oculist, as the eyelids (upper) felt as if they were "sticking to the globes." Two prescriptions were written for drops to be used alternately three times a day. These were applied for three days without any marked result, so another oculist was consulted, and, finally, two others, as alarm was felt at the non-appearance of relief.

Thinking it would be beneficial, the drops from two oculists' prescriptions were used frequently and plentifully for a day.

At this stage, when the patient was seen by me, there was nothing very marked save a little injection of the bulbar conjunctiva and reddening of the lid margins. Burning pain at the back of the eyes was complained of, but no importance was attached to these symptoms and signs, as I was not then informed of the amount of "treatment" that had been indulged in. It was decided to estimate the refraction on another day when the eyes felt a little better.

Later in the day, the patient again called in great distress, with photophobia and lacrymation. The congestion had increased; the corneæ were steamy-looking; the pupils were semi-dilated; the tension was not raised.

The patient was sent into hospital, and ice applied to the eyes.

Next day, there was a peculiar marginal haze around the cornea of the right eye, also some œdema, and, scattered all over the surface of the cornea were many grey "spots," circular, and varying in size, the largest being about 2 mm. in diameter, much photophobia, blepharospasm, and lacrymation. No discharge other than the pent-up tears.

Under treatment by ice, a very little atropine, and cocaine sparingly, the right eye began to clear and the left to be attacked in the same manner, and similarly cleared up in a few days.

I am obliged, for obvious reasons, to refrain from stating the full ingredients of the bottles or drops (used in a lavish fashion never intended by the prescribers) but there were hydrochlorates and salicylates of several drugs.

I have no doubt in my mind that this superficial keratitis was caused by the drops used in such a foolish manner.

I record the case for two reasons:—(1) superficial punctate keratitis is not common, and recorded cases number few. (2) The cause is obscure, and therefore in this instance the evident cause is interesting and important.

I remember seeing one case when Clinical Assistant at the Royal Westminster Ophthalmic Hospital. The patient was under the care of Mr. Brewerton, who had recently performed extraction for senile cataract on him. During the course of examining his vision for his glasses the condition was discovered.

TRANSLATION.

BI-FOCAL GLASSES.*

BY

Dr. H. Dor,

OF LYONS, FRANCE.

For about a dozen years, or perhaps even longer, we have seen patients, especially Americans, with bi-focal glasses, from which they derived great benefit.

Whilst up to the age of forty-five years hyperopes, myopes, and those affected with astigmia are able to employ one pair of glasses for sight at a distance and near-by, that is no longer the case when presbyopia appears. Two different glasses are then necessary for sight at a distance and sight near-by. Certain American opticians, however, have found the true solution of the problem.

A hyperope of 2 D. will have at the age of 50 to 55 years a presbyopia amounting to 3 D. I have seen Americans wearing plano-convex glasses of 2 D., with on the lower nasal side an added tiny lens of 15 mm. diameter and of 1 D. strength (Fig. 1). Such glasses fulfil their object perfectly. At 55 years the necessary lens would be 1·50 D. and at 60 years, 2 D.

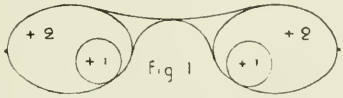

Fig 1

During the last twelve years, however, our European opticians have exhibited at all our congresses absolutely bad bi-focal glasses. These have been either Franklinic glasses, such as aged artists use, that is to say, made

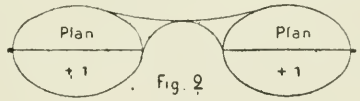

Fig. 2

Fig 3

up of two lenses, which permit sight of near and of distant objects up to the age of 50 or 52 years for the emmetrope, or else they simply cut away the

*From *L'Ophtalmologie Provinciale*, mai, 1910.

upper half, and in that way allow the painter to see clearly both his model and his picture. These glasses are all very well for emmetropes when they are used only for work. But things are otherwise when they are worn by myopes and hyperopes, and in this case the pattern shown in figure 1 is alone good.

What are our opticians doing? This question applies equally to those of Paris as of London, as well as to the great German manufactory of Rathenow. They provide us with their celebrated bi-focal glasses, constructed as shown by figure 4.

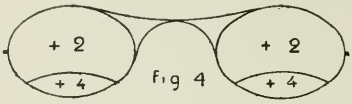

Fig 4

What is the result? It is that none of our patients are able to wear them. In figure 4, I suppose the case of a hyperope of 2 D, aged 60 years, who consequently needs a glass of 4 D. (Hm. 2 + Presby. 2) for work. If he wears his glasses whilst walking, he sees the road, the path, and the staircases as would a myope of 2 D., and in consequence he takes off his glasses, whereas he would be able to wear them all day long if they were made as shown in figure 1. In point of fact, for reading and for work, the axis of the eyes is directed downwards and inwards, and as we employ an almost constant degree of convergence, an added lens of 15mm. diameter is quite sufficient.

Our opticians therefore are either ignorant or else obstinate. In fact, about a year ago I ordered from a well-known Paris firm, a pair of spectacles *plus* 2·0 D. sph. and *plus* 4·0 D. sph., drawing exactly upon my prescription a representation of figure 1. Figure 4 was given, with the consequence that my patient has never been able to walk a step with his glasses.

As regards aged myopes, the contrary is the case. At sixty years we must prescribe *minus* 4·0 D. sph. and *plus* 2·0 D. sph. This can be readily done by taking a plano-concave glass *minus* 4·0 D. and by fastening to it with Canada balsam a small complementary glass of *plus* 2·0 D. sph.

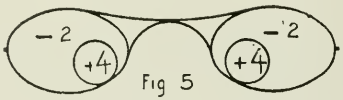

Fig 5

Well! during the ten years that I have tried to prescribe such glasses I have never been able to obtain them. That is the reason why I believe it to be my duty to sound this alarm note, as if we agree in exacting from our opticians that which can already be obtained in America they will certainly end by supplying us with what we want.

There is no necessity to occupy myself in this place with the method of manufacture. It is evident that the method of fastening one to the other of two lenses by means of Canada balsam is not perfect, and that we should grind the two different foci directly upon the glass. There is, however, one point upon which we should never compromise: that part of the glass which serves for work should be placed exclusively in the infero-internal position of the lens and should never touch the median line.

In these conditions our patients wear a single pair of spectacles all day long, since they serve equally for sight at a distance and for work.

It will be entirely to the advantage of the opticians to follow our instructions implicitly. In the meantime it may be well to employ bi-focal glasses such as are made by Bailly, Rue Terme, Lyons, of which one glass is hinged upon the other, which is fixed, and is swung into place for near vision.

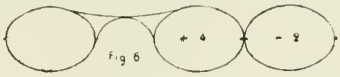

Fig 6

In a case of hyperopia of 2 D. and presbyopia 2 D. (4·0 D. in all) the fixed glass is of 4·0 D. and the other of *minus* 2·0 D.

In the case of myopia 4·0 D. and presbyopia the two glasses are of *minus* 2·0 D.

It is important that the correction for distance should be obtained by the conjunction of the two glasses, since when the glasses are in position one does not perceive that the spectacle is made up of two glasses, while the non-æsthetic appearance of the two glasses showing to the temporal side, which would be troublesome in the street or a drawing room, is of no great consequence when one is in one's own study. SYDNEY STEPHENSON.

REVIEW.

SOME MODERN DEVELOPMENTS IN THE TREATMENT OF AFFECTIONS OF THE EYE.*

BY

SYDNEY STEPHENSON, D.O. (Oxon.).

LONDON, ENGLAND.

MY subject may be taken under the following heads:—1. antiseptics; 2 analgesics; 3. serum and vaccine treatment; 4. radio-active treatment; 5. electrolytic treatment; and 6. miscellaneous remedies.

1. Antiseptics.

In the employment of antiseptic lotions to the eye, attention has been directed to the advisability of securing isotonicity and of warming the solutions to the temperature of the human body. Albrand[1] has invented a small instrument by which the antiseptic liquid can be raised to the desired temperature. Cantonnet[2] has pointed out that a 1·4 per cent. solution of common salt is isotonic with the tears, and has one advantage over the boric lotion in every day use, namely, that its reaction is not acid, so that it does not interfere with the alkalinity of the lacrymal secretion. This lotion appears likely largely to replace the so-called "antiseptic" lotions in common use.

Despite adverse laboratory reports, argyrol still retains its pre-eminence as an efficient and non-irritating antiseptic for use in superficial inflammations of the eyes. One interesting use of argyrol has been pointed out by A. E. Davis,[3] who found that 2 per cent. to 30 per cent. of the remedy could be safely

* A lecture delivered on July 14th, 1910, in the Course of Ophthalmology in the University of Oxford.

injected into the anterior chamber in cases where panophthalmitis threatened. Protargol is also still much used. Emphasis should once more be laid upon the danger of injecting either of these compounds into the lacrymal passages, more especially if there be any breach in the mucous membrane. Cellulitis and loss of the eye have been known more than once to follow neglect of this precaution (Brewerton[4], F. Park Lewis[5]). It need scarcely be said that cellulitis may also follow the injection of any other fluid, as witness recent cases by Lamm[6] and Dr. T. Harrison Butler[7]. The latter surgeon gives the useful caution never to attempt to irrigate trachomatous lacrymal sacs, since they are very friable.

Something has been heard recently of a new product, "Sophol", an albuminate of silver, which is said to contain 20 per cent. of the metal. The silver, as in other preparations of the kind, is present in what chemists call a "masked form". The product has been used to replace silver nitrate in the prophylactic treatment of babies' eyes at birth by v. Herff[8] and by Gallatia[9] and by von Gratkowski[10]. The former had one early infection only, believed to have been of ante-partum origin, among 1,150 babies whose eyes were treated with sophol. v. Gratkowski, who employed a 5 per cent. solution of sophol in 1519 births, had 0·12 per cent. of early infections and one late infection only. Schiele[11] finds a 5 per cent. solution of sophol useful in the treatment of acute trachoma, and Bock[12] finds it useful in all affections of the conjunctiva due to micro-organisms and accompanied by profuse discharge. Bondi[13] finds the 5 per cent. to 10 per cent. solution of service in cases where bacteria have effected only a superficial lodgment in the tissues of the eye. Elsewhere (THE OPHTHALMOSCOPE, August, 1908), I have reported that, in my experience, a 5 per cent. solution of sophol is an efficient and non-irritating substitute for argyrol, although without any decided advantages, in my experience, over the last-named. Indeed, the clinical action of the two remedies appears to be almost identical.

Hydrogen peroxide, a colourless liquid, which when prepared in accordance with the instructions of the British or American Pharmacopœia, contains about 3 per cent. by weight of hydrogen peroxide, H_2O_2, has been recommended by Wolfiberg[14] and S. C. Ayres[15] in blepharitis, by Kimpel[16] and Dunn[17] in ulcus serpens corneæ, by F. Allport[18], G. E. Dean[19], and Bronner[20] in gonococcal conjunctivitis, and by Jacqueau[21] in ulcerations of the cornea. It is a powerful and non-irritating disinfectant, and when employed as Merck's "Perhydrol," is a stable product, not subject to spontaneous explosion, and free, or almost free from acid. Perhydrol contains 30 per cent. by weight of hydrogen peroxide, (H_2O_2). It is supplied by the famous Darmstadt manufacturer in special bottles coated with ceresin, and packed in tins filled with *kieselguhr*. Dilutions are best made, just before use, with water that has been boiled and allowed to cool. In general, a 15 per cent. dilution is preferred in eye work—that is to say, equal parts of perhydrol and boiled water. I can testify that the remedy is most useful in blepharitis, suppuration of the lacrymal sac, and in septic ulcerations of the cornea. In my experience, the agent has no equal for cleansing pus from the eyes of babies affected with ophthalmia neonatorum, a disease upon which perhydrol appears to have, besides, a directly curative action. A case reported in the last number of the *Royal London Ophthalmic Hospital Reports* by the late Mr. W. Ilbert Hancock suggests that washing out the anterior chamber with hydrogen peroxide may have a marked influence in some instances of post-operative infection.

There are some indications that the once famous Burow's solution, a favourite non-irritating astringent and antiseptic on the Continent of Europe for external inflammatory diseases of the eye, may again enjoy a measure of

favour in this country. It consists of a 7·5 per cent. to 8 per cent solution of aluminium subacetate in water, and is identical in composition with the Liquor Aluminii Acetici of the Austrian Pharmacopœia. Before it is used to the eye, it is diluted with from five to twenty times its bulk of water[22]. It may be noted in passing that Mr. H. F. Waterhouse has recently advocated the use of a 1 per cent. solution of aluminium acetate in the treatment of burns, erysipelas, and dermatitis.

Eperon[24] has treated infective ulcers of the cornea by means of zinc sulphate, 20 per cent., applied directly to the diseased spot. One application of the sort usually sufficed to arrest the ulcerative process. Eperon recommends a similar application in Mooren's ulcer, neuro-paralytic keratitis, relapsing traumatic keratalgia, and infected wounds of the cornea generally.

Scarlet R is a coal-tar derivative that has been employed by hypodermatic injection or as a 5 per cent. ointment for the purpose of regenerating skin, as after burns or operations. This agent has been used in eye work by Wolfrum and Verf. After convincing himself by experiments upon rabbits that the application of a 5 per cent. to 10 per cent. ointment caused no local irritation, Dr. Richard Cords[23], of Leipzig, has employed successfully Scarlet R in the treatment of ulcers of the cornea, of various descriptions.

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2. Analgesics.

It is impossible, as everybody knows, to relieve deep-seated pain in the eye by means of cocaine, which is merely a local anæsthetic. For that purpose we must resort to local analgesics, among which, as first pointed out by Darier, dionine stands pre-eminent. Notwithstanding the chemosis and swelling of the eyelids and general discomfort which sometimes follow the use of a 5 per cent. solution to the eye—"ophthalmologic fireworks," as these symptoms have been termed by Dr. A. B. Hale[1]—dionine is a symptomatic remedy that the surgeon could ill-afford to dispense with. But recently we have another candidate for favour in the shape of the acid hydrobromate of codein, which, like dionine, is also a derivative of morphine. It is used in a 1 per cent. to 5 per cent. aqueous solution, and its action is said by Bonsignorio[2] to

resemble that of dionine, but to be considerably milder. It might accordingly form a suitable substitute for dionine. There is still a third analgesic which has been mentioned more than once in the literature of the last few years, and that is a 1 per cent. solution in oil of basic acoine. It was originally introduced by v. Pflugk,[3] who found that a few drops relieved pain in the eyes for several hours, irrespective of cause. It has been well spoken of by several writers, the latest of whom, Farnarier,[4] strongly recommends it as a means of relieving pain after the routine treatment of trachoma by solid copper sulphate applied to the conjunctiva. Speaking of trachoma, by the bye, an ingenious suggestion was put forward by Ginestous and Llaquet[5] a few years ago, namely, that a crayon should be made containing copper sulphate, as its active product, with orthoform and holocaine, so as to render its application to the lids more or less painless. The crayon contained one-half its weight of copper sulphate.

A word with regard to local anæsthetics, of which the oldest, cocaine, still retains the first place in the affections of practical surgeons. In this country it is usually employed as a 2 per cent. to a 4 per cent. solution before operations on the eye, although in America it has been largely replaced by a 1 per cent. solution of holocaine hydrochloride.

One or two suggestions, however, as to the method of using cocaine prior to operations, especially for cataract, deserve attention.—Dr. Carl Koller[6], who introduced cocaine originally, suggests that a few drops of cocaine should first be placed in the conjunctival sac, and that two or three minims of a 5 per cent. solution should then be injected beneath the ocular conjunctiva at the spot where the fixation-forceps will later be applied. Five minutes afterwards, operations upon the eyeball, even such as involve the iris, can be performed without pain. Fukala[7] also finds that the customary use of a 2 per cent. solution of cocaine is inadequate. He therefore injects beneath the conjunctiva a 15 per cent. solution of cocaine and uses also a solution of adrenaline chloride of the same strength, either alone or mixed with the cocaine. A quarter of an hour later, Fukala finds that the eye is completely insensitive.

I cannot help thinking that we should have fewer unruly cataract patients if we devoted a little more attention to the *technique* of securing complete local anæsthesia. The point, in my opinion, is well worth consideration.

Eusemine, a solution of cocaine and adrenaline and chloretone in physiological salt solution, was recommended by Cohn[8] as a local anæsthetic in eye work. It has previously been used in dental practice. It has yielded me excellent results, especially in operations upon the ocular muscles, such as lengthening or advancement. It has recently been praised anew by Weiss[9] in those operations, and particularly in extirpation of the lacrymal sac, where hæmorrhage is often so troublesome a complication.

There has been during recent years a tendency to give morphine or other sedatives to nervous patients some little time before operations upon the eye. "Bromural" has been specially recommended for this purpose by Ohly[10]. Of this remedy he prescribes five grains every four hours, and ten grains at night, for four or five days immediately before operation. The same preparation is administered in somewhat larger doses for a week after operation. Speaking for myself, I find "Bromidia," in doses of one drachm, of signal service given the night before operation to nervous subjects, and repeated an hour before the operation is actually performed. This preparation, according to the *Extra-Pharmacopœia*,[11] is stated to contain in each drachm chloral hydrate 15 grains, potassium bromide 15 grains, extracts of cannabis and of hyoscyamus $\frac{1}{8}$ grain each.

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3. Serum and Vaccine Treatment.

The essential difference between the serums and the vaccines is, that while the former, the serums, are derived from the blood of animals that have been immunized by bacilli or toxins, the latter, the vaccines, are obtained directly from a culture of the particular micro-organism concerned. A further distinction may perhaps be usefully made between "antitoxic" sera, on the one hand, and "antimicrobic" sera, on the other. The antitoxic sera are obtained by injecting into an animal the toxin of bacteria, while the antimicrobic sera are the product of injecting the micro-organisms themselves. Antitoxic sera act against the bacillary products known as toxins, and antimicrobic sera, on the contrary, against the micro-organisms concerned in the infective process.

Therapeutic sera are usually supplied by the makers in liquid form, and are given, as a rule, by injection into the subcutaneous tissue of the flank between the crest of the ilium and the last rib or into the lower part of the abdominal wall. When time is an important element in the case, they may be injected into one of the superficial veins. Unpleasant results seldom follow the injection of serum, if we except the production, usually between the eighth and the fourteenth day, of erythematous or urticarial rashes, which are believed to be due to something or other inherent to the serum of horse's blood. Temporary pains in and swelling of the joints, the so-called "arthropathies," are much less common. Like the antitoxin eruptions, they also are thought to have nothing to do with antibodies in the serum, but to be caused by some peculiarity in the serum of individual horses.

Both antitoxic and antimicrobic sera have been employed extensively in ophthalmology, a remark that now applies equally to vaccines.

The sera have been used in the treatment of five conditions, *viz.:* (1) diphtheria of the conjunctiva; (2) hypopyon-ulcer of the cornea; (3) ocular tuberculosis; (4) pyogenic invasions of the eye; and (5) rheumatic affections of the eye.

We may glance at these in turn:—

(1) As to the treatment of diphtheria of the conjunctiva, there can now be no question that the early injection of adequate doses of diphtheria antitoxin is a specific. But as mixed infection is almost the rule in these cases (86·04 per cent. of my own cases), local antiseptics should also be applied to the conjunctiva, for which purpose, in my experience, nothing is better than a 15 per cent. to 25 per cent. solution of argyrol. Indeed, a failure of antitoxic serum in diphtheria of the conjunctiva implies either that the serum was injected in inadequate doses or too late in the course of the disease, or else that we are dealing with a mixed infection. The treatment of post-diphtheritic paralysis of accommodation, originally recommended by Schmidt-Rimpler in 1894, has been more recently urged by Fage.

(2) Römer has employed in hypopyon-ulcer, a disease associated in at

least three-quarters of the cases with the pneumococcus, a polyvalent serum of high potency, prepared by Merck, of Darmstadt. The affection was produced experimentally in monkeys and rabbits by inoculating the cornea with pneumococci, but Römer's series also included clinical cases, as met with in man. Cases treated early almost invariably healed well, but almost 80 per cent. of successes were obtained even when the condition was advanced. Römer's pneumococcic serum has been employed by other observers, and, as usual, there is a difference of opinion with respect to its real clinical value. Axenfeld[1] perhaps sums up the general feeling about Römer's serum when he says: "For an established pneumococcal affection of the cornea, serum treatment alone is only justifiable in the very early stages; we are not justified in depending on its action. Severe cases should be cauterised at the outset." . . . . . "Delay may be fatal and destruction result." It should be added, finally, that passive immunisation as described above, has now been to some extent replaced in Römer's hands by active immunisation induced by injecting dead pneumococci.

(3) During the last few years tuberculosis has been recognised to play a very important part in the causation of many affections of the eye. The superficial manifestations of tuberculosis as it attacks the eye can be dealt with on general surgical lines, as with the knife, sharp spoon, cautery, caustics, X-rays, radium, and carbonic dioxide snow. Until recently our means of dealing with the deeper-seated manifestations of tuberculosis was limited indeed, and included merely such obvious measures as living in the open air and bright sunshine, graduated exercise, well-cooked and generous diet, and attention to the state of the skin and other emunctories. Now, thanks to serumtherapy, we appear to be reaching more tangible and solid ground. von Hippel[2] has shown that ocular tuberculosis usually yields to frequent injections of tuberculin T.R. carried out over several months, and carefully controlled by systematic records of the temperature. He has never met with any bad result as regards the general health of his patients.

(4) In some streptococcus invasions of the eye, such as occur in infected wounds, accidental or operative, antistreptococcus serum has been tried. Claiborne and Coburn[3] as the result of their experiments upon rabbits, however, conclude that it exerts no favourable influence on the course of these invasions. The same serum has been successfully employed by Darier[4] in a case of purulent ophthalmia in a baby, associated not with the gonococcus, as is usual, but with the streptococcus. Axenfeld[4a] has recommended the use of the serum in so called "streptococcal diphtheria" of the conjunctiva, and also in metastatic inflammations of the eyeball.

(5) Deschampes[5], of Grenoble, has tried serum-therapy in certain rheumatic affections of the eye, employing for the purpose the anti-rheumatic serum of Rosenthal-Berlioz. From his experiences gained in the treatment of three cases of rheumatic iritis, Deschamps concludes that the serum has an evident action on the ocular manifestations of tubercle. At the same time the serum should not be trusted to alone.

With regard to vaccines, those employed in eye work have so far included staphylococcus vaccines, gonococcus vaccines, pneumococcus vaccines, and streptococcus vaccines. Dr. H. Grey-Edwards[6], of Bangor, has published cases of hypopyon-ulcer in old men successfully treated by the injection of staphylococcus vaccine. Dr. Ernest Maddox[7] has reported a striking case of improvement after injection of Wright's anti-staphylococcus vaccine in a case of desperate irido-cyclitis following extraction of cataract. Furthermore, he has spoken well of the same product in a case of orbital cellulitis. Mr. Stephen Mayou[8] has treated quite a number of cases of staphylococcal

infection of the eye with the mixed staphylococcal vaccine prepared by the Lister Institute of Preventive Medicine. Upon the whole, the results obtained by Mr. Mayou were good. Mr. Harold Grimsdale[9] has excellent results in two cases, one of septic trouble after removal of cataract, by the administration of an emulsion of staphylococci by the mouth. A most important communication dealing with the treatment of gonococcus infections by vaccines was published in the *Lancet* of July 10th, 1909, by Drs. John Eyre and Bernard H. Stewart. Among the 53 cases which they had treated by those means were four of gonorrhœal iritis. Pain was speedily relieved, and all the cases showed marked improvement under the treatment by vaccines. The authors advocated small doses at frequent intervals. Dr. Shumway[10], of Philadelphia, has reported a case of gonorrhœal iritis, with arthritis, successfully treated by the injection of gonococcus vaccines. In this case, too, pain and photophobia were quickly relieved (THE OPHTHALMOSCOPE, April, 1910, p. 298).

Any account of vaccine treatment would be incomplete that did not include a reference to Professor Deutschmann's yeast serum[11], as well as to Dr. Darier's views on so-called "paraspecific serotherapy."

Deutschmann's product is obtained by injecting ascending doses of yeast into rabbits, and then preparing a curative serum from the blood. At least, it was originally prepared in this way, but it is now obtained from horses fed upon increasing doses of yeast. The serum, Deutschmann claims, has a distinct influence upon pyogenic infections, as hypopyon-keratitis, iritis, and infected wounds, accidental or surgical, although it contains neither antitoxic nor bactericidal properties. The serum is believed to act as a stimulus to phagocytosis—to be, in fact, a leuco-stimulant. It has been well spoken of by E. v. Hippel[12], Darier[13], and Zimmermann[14]; damned with faint praise by Axenfeld[15]; and condemned outright by Schmidt-Rimpler and Napp[16]. If properly employed, however, the Deutschmann serum does no harm, and sometimes has a most favourable result. It is, therefore, worth extensive trial, more especially in pyogenic invasions of the eye. It is injected into the wall of the abdomen or chest, or (in larger doses) it may be administered by the rectum. It may be obtained from Ruete-Enoch, 5, Hermannstrasse, Hamburg, Germany.

To the current conception that this or that therapeutic serum is specific only against a particular microbic infection, Darier[17] opposes the counterview, namely, that in addition to a specific action, each serum has a side action against infections of all kinds. Acting upon this theory, Darier has introduced a new method of treatment, which is known as "paraspecific therapy" or "non-specific serum therapy." No matter what the particular infection, he injects a serum, such as that of diphtheria, which can be readily obtained in any part of the civilised world. By these simple means he claims to be able to do good in practically every infective disease of the eye, and his cases seem to prove that his views are correct. The serum, as usual, may be injected into the subcutaneous tissue or may be given by the mouth.

Axenfeld[15] has attacked the "paraspecific" or "non-specific" serum treatment, as recommended by Darier, mainly on the ground that "absolutely no experiments on animals' eyes have been carried out—to test and control the observations made on man." From experiments made in his own laboratory by Happe and v. Szily, Axenfeld concluded that the serum exhibited no influence against either local or general infection.

Meanwhile, cases accumulate which show that Darier's treatment is most efficacious. In my opinion, it is unwise to ignore so large a body of clinical evidence, laboratory results notwithstanding.

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4. Radio-active Treatment.

Radio-activity, as obtained either from X-rays or the element radium, has been much employed in ophthalmology. As to X-rays, I intend to say nothing, except to draw attention to the results said to have followed the employment of intermittent flashes in the treatment of the most diverse affections of the eyes. Dr. David H. Coover[1] has described his experiences with these intermittent X-rays, the application of which calls for a specially-designed apparatus, consisting of a small motor, a condensor, a moving shaft, and a regulator. Forty to six hundred flashes can be given in a minute, but in eye conditions the best results are obtained by 75 to 150 flashes per minute and by a working distance from the tube of 15 inches. The cases treated by this complicated apparatus numbered nine, and included corneal ulcers (4), irido-cyclitis (2), and optic atrophy (3).

Apart from this method, concerning which our information is as yet very scanty, radium appears to be a most useful method of treating many diseases of the eye and the surrounding parts. A few mg. of radium bromide are placed in a sealed glass tube, and the little apparatus is applied (with suitable precautions) close to or over the eyelids for a determined time. An interval of some weeks is generally allowed to elapse before another application is made. It is obviously important to standardise every specimen of radium before it is employed, and fortunately there are simple means of accomplishing this. It is probably important to use as much radium as may be.

Our knowledge of the so-called *alpha*, *beta*, and *gamma* rays grows apace. The *alpha* rays, which make up a large percentage of the total output, carry a positive charge, and have little penetrative power. The *beta* rays carry a negative charge, and resemble the cathodic rays of a Crookes' tube. The *gamma* rays have been called "a pocket edition of the Röntgen rays," with which they appear to be identical. They carry no charge, produce radiograms, and possess intense penetrative powers. It is probable that the therapeutic effects are more closely connected with them than with the other emanations, known or unknown, given off by radium.

Radium has been successfully employed in a host of ocular diseases of a superficial character. For example, it has cured epithelioma, sarcoma, rodent ulcer, and nævi of the eyelids, spring catarrh, hypopyon-keratitis, trachoma, inflammations of the uveal tract, to mention but a few of the outstanding diseases in which it has been successfully applied.

According to a recent communication by Dr. James Mackenzie Davidson[2], radium has yielded astonishingly favourable results in many cases of eye

disease. It must, indeed, be looked upon as one of the most important therapeutic agents in superficial diseases of the eye. In four cases of spring catarrh it was used with success. In hypopyon-ulcer, ulcers of the cornea generally, episcleritis, and pterygium "it has yielded results superior to any other known method of treatment." So far, however, radium has failed to benefit the deeper-seated diseases of the eye. Mr. Arnold Lawson[3], working with Mackenzie Davidson, had excellent results in three cases of hypopyon-keratitis, which yielded to from one to three exposures to radium. Pterygium, spring catarrh, and episcleritis, were also cured by the emanations. The conclusion is that radium is "a very powerful and successful agent in the treatment of eye diseases." It is impossible not to attach great importance to these observations of Dr Mackenzie Davidson and Mr. Arnold Lawson. The only pity is that the expense of radium precludes any wide dissemination of that element among ophthalmic surgeons.

As to the treatment of trachoma by radium, there is a difference of opinion. Hermann Cohn[4] reported that he had cured three cases of trachoma by touching each granulation daily with a glass tube containing a crystal of radium bromide, and his observations were, in effect, confirmed by Beck[5], Thielemann[6], Selenowsky[7], Thiébault[8], and Falta[9]. On the other hand, Mr. N. B. Harman[10], obtained no improvement in two patients upon whom he experimented, although 37 applications were made in one, and no fewer than 139 in the other. Mr. E. Treacher Collins[11], again, obtained no very encouraging results from the treatment of trachoma with a tube which contained 5 milligrammes of radium of low radio-activity Some explanation of these discrepant results may perhaps be found in the employment of radium, which it was quite within the bounds of possibility was not all it purported to be. Before leaving the subject, a word may be said about the experiences of Fortunati[12], who had employed and abandoned radium in the treatment of trachoma. He found, as the result of further experiments, however, that after the application of radium, the disease yielded very readily to local applications of copper sulphate.

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5. Electrolytic treatment.

When a continuous current is passed through a solution of a salt, the basic portion of the salt goes to the negative pole, and the acid portion to the positive pole. By this means active drugs can be made to traverse the unbroken skin, and be localised in any given spot. This elementary fact has been known to physicists for years. Full advantage of the observation, however, has only recently been taken in therapeutics, although isolated attempts to do so were recorded years ago under the name of "cataphoresis."

Thanks to recent work, it is now known that by this method the ions of zinc, copper, magnesium, lithium, and of many other substances may be introduced into a patient's body. The method is comparatively simple, and requires no complicated or expensive apparatus to carry it out properly.

It would be strange indeed if the electrolytic treatment had not been tried in ophthalmology. Drs. H. P. Taylor and H. Lewis Jones[1] reported great improvement in a case of intractable trachoma from a single application of 1 m.a. of zinc ions for two minutes. The authors further mention two cases of Mooren's ulcer treated by ionic medication. One case was completely cured after a single application of zinc ions, and the other after two or three. An important communication on the subject was published by Wirtz[2] during 1908. Experiments were made on animals, in order to get information as to dosage and intervals. Wirtz treated cases of corneal ulcer (6), interstitial keratitis (6), nebulæ (3), episcleritis (2), and various forms of acute and chronic inflammation of the conjunctiva. The ions of zinc, iodine, chlorine, and copper were employed,and the results were in many cases strikingly successful. In a later communication Wirtz[3] adduced further proofs of the efficacy of cataphoresis. He has treated successfully sixteen cases of hypopyon-ulcer with zinc-ions. Zinc-ions were found to be of signal service not only in hypopyon-keratitis, but also in recurrent erosion of the cornea and blepharitis ulcerosa. Striking results were obtained with chlorine ionisation in the case of the corneal opacity. Mercury-ions improved a desperate case of syphilitic irido-cyclitis, where removal of the eyeball had actually been suggested. Scleritis, also, yielded to treatment with mercury-ions. Of seventeen cases of hypopyon-keratitis Ervin Zahn[4] cured fourteen with zinc ionisation. In five cases a single application sufficed; two were required in ten cases; and three in two cases. One to four sittings with zinc ionisation healed ten cases of diplo-bacillary ulceration of the cornea. Dendritic ulceration was cured by the same method, and so was blepharitis ulcerosa. Five cases of interstitial keratitis failed to benefit from iodine ionisation, and a negative result followed chlorine ionisation in five corneal opacities and four cases of scleritis. H. M. Traquair[5] treated twenty-one cases of hypopyon-keratitis with zinc ions, and in some obtained marked success.

If there be one affection more than another that should be benefited by iontophoresis it is assuredly trachoma. Indeed, good results were obtained by Wirtz from the introduction of copper-ions in two cases of old and six of fresh trachoma. It is therefore somewhat disappointing to find that Mr. E. Treacher Collins[6] reports unfavourably of his experiences of the method. The process, in his experience, is a decidedly painful one, and is followed by considerable hyperæmia. It is more painful than the application of the copper stick, and, says Mr. Collins, "I cannot say that so far I have found it any more efficacious." Following a suggestion of Dr. Lewis Jones, however, Mr. Collins has punctured the trachoma bodies with a copper needle, and then passed for one minute a current through them of 2 to 3 m.a. By these means the absorption of the follicles certainly seems to be promoted.

Mr. Angus Macnab[7] has had favourable results in the treatment of diplo-bacillary ulcers of the cornea from zinc ionisation. He uses a zinc electrode dipped in zinc sulphate carrying a current of 1 to 2 milliamperes, and applied to the ulcer for about one minute.

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6. Miscellaneous Remedies.

Under this head we may consider: (a) pyocyanase; (b) fibrolysin; (c) sodium salicylate; (d) thyroid extract; (e) potassium iodide; and (f) carbonic acid snow.

(a) It has been known for several years that a fatal result could be averted in animals injected with anthrax if they were inoculated with sterilised broth cultures of the bacillus pyocyaneus, the micro-organism of green or blue pus. A product named **pyocyanase** was isolated from this product in 1899 by Emmerich and Loew[1].

This ferment-like substance has recently attracted the attention of ophthalmic surgeons. By Lowenstein[2] it was applied with good results to inflammations of the conjunctiva due to staphylococci and streptococci, as well as to some other superficial diseases of the eye. In deep-seated affections, such as gonorrhœal ophthalmia, Lowenstein's results were not so good.

The chief application of pyocyanase, however, has been found in hypopyon-keratitis. In that disease it has been adopted by Heilbron[3], by Arens[4], and by Bronner[5]. The results are reported to have been excellent in Arens's cases, which numbered seventeen. The average stay in hospital of the patients was four to ten days. The resulting leucoma was much less than after applications of the galvano- or thermo-cautery. Dr. Bronner, of Bradford, who applied 50 per cent. pyocyanase drops to the affected eye every hour, had excellent results in the treatment of six cases of hypopyon-keratitis. He employed, however, atropine drops and hot fomentations, in addition to the pyocyanase.

The various reports concerning this interesting proteolytic enzyme suggest that it is worthy of serious attention in the treatment of that grave condition known as "hypopyon-keratitis" in this country and as "ulcus serpens corneæ" elsewhere.

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(b) **Fibrolysin**, which is a compound of thiosinamine and sodium salicylate, has attracted some little attention in ophthalmic circles of late years. It is freely soluble in water, and is employed as an intra-muscular injection. It is placed upon the market as a sterilized solution put up ready for use in *ampoules*, each of which contains the dose for one injection, *viz.*, 2.3 cc.

Fibrolysin has been employed with the idea of procuring the absorption of pathological fibrous tissue. There are the usual conflicting reports as to its value in ophthalmology.—On the one hand, Domenico[1] obtained good results in leucomata, specific papular iritis, and exudative choroiditis, giving from ten to eighteen injections. Grossmann[2] obtained a surprisingly favourable result in an upper eyelid deformed as the result of a scald, and also in a case of lacrymal stenosis. In corneal opacities and in retro-ocular neuritis, on the contrary, the results were doubtful. Windmüller[3] again reported encouraging results from the local application of fibrolysin and dionine in corneal opacities. Lastly, Cauvin[4] succeeded in curing two cases of long-standing stricture of the nasal duct by injections of fibrolysin.

On the other hand, Jadin[5] who employed thiosinamine subcutaneously, treated twenty patients suffering from optic atrophy, acute neuritis, retinitis

pigmentosa, and retro-ocular neuritis, and, as the result of his experiences, reported altogether adversely to the new product. In his opinion, indeed, the treatment did no good whatever, and in several instances appeared to do actual harm.

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(c) As long ago as 1899, Dr. H. Gifford[1], of Omaha, urged the efficacy of massive doses of **sodium salicylate** in the treatment of sympathetic ophthalmitis. In America, the suggestion was taken up by several writers, as Bane, Campbell, de Schweinitz, and Webster Fox, while in Germany, Heuse, and in Sweden, Lindahl and Widmark have confirmed Gifford's claims. I believe I am correct in stating that in this country nothing has yet been published upon the subject.

Gifford[2] recommended that for every pound of the patient's weight the average individual should take one grain of sodium salicylate in the 24 hours (say 150 grains a day), and that if it did not produce marked and rapid improvement, the dose *per diem* should be augmented to 200 grains. "Many cases of ocular infection," wrote Gifford, "which show little or no improvement on 120 grains a day, will show a most astonishing gain on 150 to 200 grains." Since the year 1896, Gifford has treated 16 cases of sympathetic disease by these means, and has had 2 bad, 1 moderate, 1 good, and 12 very good results. It may be noted, finally, that the treatment with massive doses of the salicylate is recommended by Gifford, not only in sympathetic disease, but also in iritis, interstitial keratitis, and traumatic and other infections. Dr. Webster Fox[3], who has obtained brilliant results from salicylate in corneal ulcerations, especially of the dendritic variety, surmises that in cases of severe ocular inflammation there is an acquired immunity to large doses of the drug. "I have seen," writes Fox, "a man weighing a hundred and eighty pounds taking three drachms of the drug for ten days successively with marked benefit and with astonishing tolerance."

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(1) **Gifford.**—*Journ Amer. Med. Association*, February 10th, 1900.
(2) **Gifford.**—THE OPHTHALMOSCOPE, April, 1910.
(3) **Fox, Webster.**—*Pennsyl. Med. Journ.*, October, 1909.

(d) **Thyroid extract** has been given internally in doses of one to two grains two or three times a day in cases of interstitial keratitis by Dr. McCluney Radcliffe[1], of Philadelphia, who spoke highly of the treatment. By a curious coincidence, another American ophthalmic surgeon, Dr. S. D. Risley[2], wrote almost at the same time as Dr. McCluney in praise of thyroid. My own experiences of thyroid (which have been wholly favourable) have been reported elsewhere[3]. The same remedy has been praised more recently by Mr. Percy Dunn[4].

In several cases of chronic glaucoma I have observed the intra-ocular tension fall coincidently with the internal administration of thyroid.

REFERENCES.

(1) **Radcliffe.** THE OPHTHALMOSCOPE, September, 1908, and *Amer. Ophth. Society*, July 15th, 1908.
(2) **Risley.** *Ophthalmic Record*, July, 1908.
(3) **Stephenson.** *Polyclinic*, 1909.
(4) **Dunn.**—*Clinical Journal*, February 16th, 1910.

(e) **Potassium iodide** is such an ancient ally of the ophthalmic surgeon that it might well appear a work of supererogation to say anything further about it. But of late years it has been put to two novel and interesting uses. 1.—To Dor, junior[1], we are indebted for what may be a most important plan of preventing post-operative infections of the eye, namely, by giving, three times a day, for three days before operation fifteen grains of the salt. Speaking for myself, I have had excellent results in the case of a young man affected with lamellar cataract, in whom every surgical intervention was followed by irido-cyclitis until the iodide was administered in the way recommended by Dor. Several operations, undertaken when the patient was under the influence of the remedy, were quite devoid of post-operative complications. 2.—Potassium iodide has been employed with a view to clearing up the opacities of cataract, incipient, or advanced. The suggestion originated from Badal[2] in the year 1901. Verdereau[3], who employed subconjunctival injections of the salt, found that a distinct effect was produced. Bourgeois had successful cases, more especially in young subjects. v. Pflugk[4] used the iodide by subconjunctival injection two or three times a week, abrogating pain by the instillation of 1 per cent. acoine oil. His figures can only be described as striking.—Fifty-five cases of cataract were treated. Much improvement followed in 53 per cent.; improvement in 33 per cent.; and 14 per cent. only remained without appreciable alteration. Complications were noted in no single instance. Before leaving the subject, it may just be added that Dr. C. A. J. Irwin[5] has applied iodine to the eye by cataphoresis with the same end in view.

REFERENCES.

(1) **Dor.**—*L'Ophtalmologie Provinciale*, December, 1906.
(2) **Badal.**—*La Clin. Ophtal.*, August, 1901.
(3) **Verdereau.**—*Archivos de Oftal. Hisp.-Amer.*, October and November, 1904.
(4) **v. Pflugk.**—*Med. Klin.*, February 16th, 1908.
(5) **Irwin.**—*A System of Ophthalmic Therapeutics.* By Casey A. Wood. 1909, p. 760.

(f) **Carbonic dioxide** was introduced by Dr. W. A. Pusey,[1] of Chicago, as a convenient and efficacious means of destroying nævi, warts, senile keratosis, and so forth. It had two outstanding advantages over liquified air, which had been employed for the same purpose. In the first place, it could be readily obtained wherever soda fountain supplies were sold; and, secondly, it could be kept in cylinders for an indefinite time. The agent was applied as the semi-solid snow formed by the gas as it escaped from the cylinder where it was stored. Applications lasted from five to thirty seconds, according to the size and nature of the lesion. The parts were soon frozen, and this was followed by local redness and swelling, the production of vesicles, and healing under a slight scab. The resulting cicatrix was inconspicuous. As regards eye work, the use of carbonic dioxide snow has been recommended by Mr. Bishop Harman and Dr. E. R. Morton[2] in rodent ulcer and in papilloma of the lids. The results in such cases, according to those authors, must be seen to be believed. A single application of the snow to the diseased surface for forty seconds caused complete disappearance of the growths. The method, which was almost painless, had also been used by the authors in trachoma, an application being made for from fifteen to twenty seconds once a week.

REFERENCES.

(1) **Pusey, W. A.**—*Journ. Amer. Med. Association*, October 19th, 1907, p. 1354.
(2) **Harman, Bishop and Morton, E. R.**—*British Medical Journal*, July 30th, 1910, p. 287.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—ARTERIO-SCLEROSIS.

(1) Straub, M.—On the prognosis of retinal hæmorrhage caused by arterio-sclerosis. (Ver de prognose van netvliesbloedingen door arteriosclerose.) *Ned. Tijdschrift voor Geneeskunde*, 1908, I, No. 23.
(2) Wilmer, W. H.—Arterio-sclerosis in relation to ocular lesions. *Journ. of Ophthalmology and Oto-Laryngology*, June, 1909.
(3) Rohmer.—A report upon ocular arterio-sclerosis. (Rapport sur l'artério-sclérose oculaire.) *L'Ophtalmologie Provinciale*, mai, 1910.
(4) The ocular symptoms of Arterio-Sclerosis. *British Medical Journal*, 14th May, 1910.

(1) **Straub** saw in a short time 15 cases of retinal hæmorrhage, caused by arterio-sclerosis, in private patients, all of which were well in other respects but their eyesight. Their urine contained no albumen or sugar. These 15 patients Straub could follow for a period of five years, and thus he is able to give a contribution to the question of the prognosis of the illness. The prognosis seems to be bad as to life, when the hæmorrhage occurs in the period between 49 and 63 years. Of his 9 patients at this stage of life, six died from apoplexia cerebri within five years. The four patients older than 63 were still alive after five years, and those under 49 just as well. From 49 to 63 years seems to be a critical period. Straub further notes that none of his patients went blind in both eyes, although three of them acquired secondary glaucoma in the other eye. G. F. ROCHAT.

(2) **Wilmer** first clears his ground by defining the term "arterio-sclerosis" as applied clinically to all thickened vessels, other than those thickened by atheromatous degeneration, and includes:

1. Hypermyatrophy.
2. Hypermyatrophy with thickening of the interior coat.
3. Those in which the adventitia is also thickened.

Ætiology.—The causes of arterio-sclerosis are considered, and Russell is quoted at length: "The first step is the presence in the blood of toxic substances or of muscular excitants. These cause hypertonic contraction, not only of arterioles but of arteries, which have a muscular coat at least of the size of the brachial. The capillaries often share in the contraction. . . . The presence or continuance of the hypertonic contraction leads to hypertrophy of the muscular coat of the arteries. . . . . The thickening of the intima is the result of a long-continued irritation of its tissues by substances present in the blood."

Diagnosis.—Importance of early diagnosis emphasized. Examination—(1) of eye; (2) of the circulatory apparatus; (3) of kidneys—contribute to the complete clinical picture. The *rôle* of the ductless glands in circulatory disturbance is dealt with: in arterio-hypertonus their influence is not to be ignored. The ophthalmologist is recommended to consider the picture as a whole and from every available point of view.

As regards the influence of the disease on the various tissues of of the eye.—*Cornea*: direct relation of the disease to the arcus senilis not established; indirect relation assumed. *Lens*: as a cause of cataract, relation well recognised. *Retina*: nowhere can the sclerosis characteristic of the disease be so well studied as here, and the admirable description by de Schweinitz (*Trans. Amer. Ophth. Soc.*, 1906, abstract in THE OPHTHALMOSCOPE,

August, 1908, p. 634) is adopted by the writer. *Choroid*: this tissue shares in the sclerosing process. *Optic nerve*: atrophic changes result from deficient nutrition and from direct pressure by related blood-vessels.

Treatment: rest, mental and physical. *Dietetic*: it may be necessary to prohibit all meat and stimulants. *Constipation*: tepid baths to keep the skin healthy. *Drugs*: iodine and preparations, nitro-glycerine and nitrites. The earlier the disease is recognised the better. Early treatment may avert visual impairment and prolong most valuable lives. HENRY L. G. LEASK.

(3) **Rohmer**, of Nancy, limits himself to discussing arterio-sclerosis of the eye among old people. The condition may show itself either as a physiological or as a pathological process. Arterio-sclerosis with its pathological accidents may give rise to more or less extensive retinal hæmorrhage, to so-called embolism of the central artery of the retina, and to disturbances of equilibrium in the exchange of the nutrient fluids of the eyeball. The physiological state, however, of an arterio-sclerotic eye—otherwise spoken of as a physiological arterio-sclerosis—is at first sight more difficult to conceive. If it be admitted that arterio-sclerosis or atheroma is the rust (*rouille*) of arteries, it becomes easy to understand that the natural evolution of the organism brings about, when the age allows of it, an arterio-sclerotic alteration. Many of those who suffer from arterio-sclerosis have arteries modified or changed in their structure, without necessarily having pathological accidents or notable changes in the function of the eye. It is this state of the eye conjointly with senile sclerosis of the tissues which constitutes the "senile eye," and may lead to sub-conjunctival hæmorrhages, gerontoxon, possibly certain forms of cataract, diminution of accommodation, enfeeblement of the visual acuity, the last being due to alterations in the retina and optic nerve. What are the lesions in the vessels of the eye provoked by arterio-sclerosis? They are evidently the same as in all other organs. Speaking broadly, they lead to interference with the circulation and to an alteration in the more noble elements of the organ. Of all the pathological changes it is especially the localized proliferation at certain points in the internal and middle coats of the vessels which lead to contraction in the lumen of the vessels and may even obstruct them completely. In every instance these obstacles to the circulation contribute to favour coagulation of the blood and to organise vascular thromboses, arterial or venous. It must be borne in mind that the capillary pressure is often augmented in arterio-sclerotic subjects.

If all arterio-sclerotics are not necessarily affected with ocular accidents that is due to the fact that the changes are often localized to certain vascular territories and, relatively speaking, to the arteries of the eye. Moreover, many lesions of the eye assigned to arterio-sclerosis are probably due less to local alterations in the vessels of the eye than to the disturbances in the equilibrium of the general circulation set up by arterio-sclerosis acting through the intermediation of the heart and the kidneys. After giving a description of the general symptoms of ocular arterio-sclerosis and after having shown how this lesion may produce cataract (sclerosis of the ciliary vessels), atheroma of the carotid (delayed renal excretion), obstruction of the ciliary arteries, and aneurism of the retinal arteries, the author points to the analogous structure of the retinal arteries and those of the brain. In this way a retinal hæmorrhage may, up to a certain point, lead one to foresee a cerebral hæmorrhage, while the contrary is far from being always true.

As to the obstruction of the vessels, all researches go to show that embolism is exceptional, if not impossible, and that thrombosis, consecutive to endarteritis proliferans, is usually the cause of obstruction in the vessels of

the fundus oculi. That which is true of the artery is also true of the vein. At the level of an endarteritic prominence, a clot forms, and this may block the vascular lumen, either suddenly or more gradually. The obstruction may come about in four different ways.—1.—By a mechanical or anatomical obstacle, as elbowing (*coudure*) of the vessel at its entrance into the optic nerve or by narrowing at the level of the lamina cribrosa; 2.—By endarteritis proliferans, the commonest cause; 3.—By œdema of the walls of the vessel; and 4.—By contraction (Hoppe) or by impairment of the vessel walls.

It is clear that weakening of the cardiac action might, acting in conjunction with the causes named above, powerfully aid the production of thrombosis. All these reasons make us comprehend why embolism should be so rare in an artery so small as the central artery of the retina, lying so far from the heart, and so isolated from the general circulation, to which, lastly, access would seem extremely difficult to an embolus obliged to traverse, from its starting-point, the heart, a most devious path in order to reach its destination in the eye.

From an anatomical point of view, four groups of retinal hæmorrhages due to arterio-sclerosis may be distinguished: (1) those due to fragility of the retinal vessels, arteries or veins; (2) those due to venous thrombosis; (3) those due to arterial thrombosis; and (4) those due to simultaneous obstruction of both sets of vessels.

Arterio-sclerosis may provoke glaucoma in several ways, as follows.—(1) by creating an obstacle to the escape of liquid into the ciliary veins; (2) by modifying the composition of the liquids of the eye; (3) by setting up arterial hypo- or hyper-tension; and (4) by producing œdema of the vitreous.

A section is devoted by Rohmer to the connection between retinitis circinata, on the one hand, and arterio-sclerosis, on the other.

SYDNEY STEPHENSON.

(4) "The early diagnosis of arterio-sclerosis—a disease not confined to the aged—is a matter of supreme importance to the patient, because it is only at the commencement of the malady that effectual measures can be taken to combat the pathological processes, which if allowed to develop unchecked lead almost invariably to early death. Careful ophthalmological examination often enables a true diagnosis to be made at a stage when recovery is not impossible. Osler has stated that the vessels of the head, of the heart, or of the kidneys may be in a state of advanced sclerosis without any change in the palpable arteries. The disease may progress more rapidly in the large vessels, but the most serious form, and the form most frequently met with in young persons, is that in which the smaller vessels are chiefly affected. It is therefore of the highest importance to recognize sclerotic changes in the smaller arteries, and this can be accomplished only by detecting the characteristic changes in the retinal vessels. Unfortunately it by no means follows that, because the retinal vessels are normal, sclerosis is absent in other smaller vessels in the body; on the other hand, the full brunt of the disease may fall upon the retinal arteries, and the extensive changes present in the retinal vessels may not be accompanied by general arterio-sclerosis. Nevertheless, *the retinal vessels are the best indicators of the state of the small vessels elsewhere that we possess.* The retinal vessels may be extensively sclerosed, and yet the kidneys may have normal arteries, and albuminuria may be absent even when the kidneys are granular. When arterio-sclerosis is present the prognosis becomes important, both from the point of view of vision and of life. We are all familiar with the general prognostic significance of albuminuric retinitis. The large majority of the patients die within two years, and a considerable percentage within the first year. In ocular sclerosis, Woodruff says: 'Not until the gross lesions

have shown themselves in the eye can we positively say that a fatal termination is apt to occur. The mere fact that such conditions exist in the retinal vessels does not warrant us in assuming that the disease is going to progress to such a stage as to affect the functions of the kidneys or to cause degenerative changes in the brain.' Gunn stated that only when sclerosis had advanced so far as to cause hæmorrhages in the retina could we speak of the probability of an approaching cerebral hæmorrhage. Schweinitz, who has written extensively on this subject, has divided the retinal signs into the suggestive and the pathognomonic. Suggestive signs are uneven calibre and undue tortuosity of the arteries, increased distinctness of the light reflex from the vessels, and alteration in the calibre of the veins. They suggest an under-exposed photograph which has been intensified, but they are subtle changes which can only be detected with any degree of certainty by the expert ophthalmoscopist. Pathognomonic signs are marked irregularity in the calibre of the arteries, a beaded appearance, the 'silver-wire' appearance, and the indentation of the veins by the arteries at points of crossing. Late in the disease we may get perivasculitis, hæmorrhages, and œdema of various parts of the retina. When hæmorrhages are present, the blood pressure is generally raised. Subconjunctival hæmorrhages are often, if continually repeated, the heralds of approaching apoplexy—little leaks which presage a larger outflow. These symptoms were admirably described in a paper read to the Ohio State Medical Society at Cincinnati, May, 1909, and published in the *Annals of Ophthalmology*, October, 1909, and our remarks have been chiefly gathered from this source."

II.—CINEMATOGRAPH AND EYE TROUBLES.

Ginestous.—*Gazette Hebdom. des Sciences Méd. de Bordeaux*, No. 23, 1909.

Ginestous classifies the ocular disturbances following the watching of cinematograph pictures as follows:—

1. Temporary and fugitive effects: lacrymation, photophobia, fatigue necessitating the closure of the eyes for a few seconds only.

2. More lasting troubles: retinal adaptation impossible, distress recurring as soon as the eyes are opened, and the patient is compelled to relinquish the task of looking on.

3. Prolonged effects: a veritable conjunctivitis, lasting some days, without agglutination of the lids, but with conjunctival redness, smarting, itching, lacrymation, and photophobia.

4. Occasionally retinal and accommodative asthenopia.

These symptoms are assigned to individual sensitiveness, to defective films irregularly exhibited, fatigue from being too far from the screen, too much or too little light,

Prognosis is favourable—most cases get well without treatment as long as the exhibitions are avoided. Cocaine and adrenalin drops give immediate relief. Blue or yellow glasses are of prophylactic value.

J. Jameson Evans.

III.—THE EYE IN NERVOUS AFFECTIONS.

(1) Rodier.—Irregularities of the pupil in general paralysis of the insane. *Recueil d'Ophtalmologie*, avril, 1909, and *British Medical Journal*, Epitome, 25th September, 1909.

(2) Duncan, J. T. - Ocular conditions in a case of juvenile tabes, with presentation of the patient. *Canadian Practitioner and Review*, October, 1909.

(1) **Rodier** confirms the views of Joffroy and Schrameck, who see in irregularity of the pupil an early symptom of the parasyphilitic diseases, tabes dorsalis, craniotabes, and general paralysis of the insane. It is the first stage of those changes which ultimately end in typical reflex iridoplegia, and sometimes in complete paralysis of the pupil. Every example of the Argyll Robertson pupil has at some time or other shown irregularities in its contour. A pupil which has once shown irregularity may become modified in shape, but it never again becomes truly circular. Atropine intensifies the irregularities, which are due to localized islets of paresis of the sphincter iridis. The deformity is generally at first monolateral. It may be detected simultaneously with the disordered reflex, which it may only precede by a short interval of time. The commonest changes in shape are the oval and ellipsoidal. The two pupils do not always show the same kind of deformity.

(2) The history of **Duncan's** case goes back seven years, when the girl was attending school and well. Her age was then thirteen. The first symptom which appeared was a swelling of the right side of the neck ; soon after she began to suffer from severe head pains which would cause her to throw herself on the floor, screaming. She often vomited during these paroxysms. She was placed in hospital, and as her symptoms pointed to cranial tumour, operation was advised, but refused. She was now quite blind, and unable to walk. Her condition at the time of the report, was as follows : a healthy, well-nourished girl of twenty ; she has no headache, or pain of any kind. There was no history of specific disease. The superior rectus muscle shows paresis. Typical Argyll Robertson pupils are present. Examination of the fundi shows grey atrophy. There is no anæsthesia, and no loss of motor power ; knee jerks are present, the right more pronounced than the left. Co-ordination is perfect in the arms and legs. The writer discusses the question, whether children suffer from tabes or not. He concludes that we do meet with juvenile tabes, of which this case is an example.

HANFORD MCKEE.

IV.—ARTIFICIAL EYES.

(1) Coulomb Robert.—On the wearing of an artificial eye during the night. (Du port de l'œil artificiel pendant la nuit.) *Société française d'ophtalmologie*, Congrès de 1909.

(2) Coulomb.—On wearing the artificial eye during the night. (Du port de l'œil artificiel pendant la nuit.) *L'Ophtalmologie Provinciale*, juillet, 1909.

(1) **Coulomb** (Paris) discusses the *pros* and *cons* of the question as to whether patients should be allowed to sleep with an artificial eye in place. He comes to the conclusions that a well fitted and well tolerated eye can be worn night and day, and that such conditions are attainable by scrupulous cleanliness, by the use of a smaller eye at night, and by the renewal of the

eyes more frequently than is ordinarily required. If an eye in good condition, worn only in daytime, produces a catarrhal condition, then the use at night of any artificial eye is contra-indicated. ERNEST THOMSON.

(2) In **Coulomb's** experience, an artificial eye can with impunity be worn at night as well as by day in a number of cases, where the cosmetic effect at that time may be desired, *e.g.*, with married people. It is important to have the prothesis somewhat smaller than usual, and it may perhaps be necessary to have it re-polished or renewed more frequently than when worn by day only. BERNARD CRIDLAND.

V.—MIGRAINE.

(1) **Lévy, Ferand, and Baufle, Paul.**—Migraines. (Les Migraines.) *Gazette des Hôpitaux*, janvier 15, 1910.

(2) **Rankin, Guthrie.**—Migraine. *Clinical Journal*, July 27th, 1910.

(1) This article by **Lévy** and **Baufle** constitutes a kind of summary or review of our knowledge of migraine. The opening paragraphs define migraine and refer to the older writers from Hippocrates to the eighteenth century. Then follow the symptoms, clinical forms, ætiology, pathogenesis, diagnosis, and treatment. ERNEST THOMSON.

(2) According to **Rankin**, of London, migraine is an hereditary ailment, met with, as a rule, in neuropathic families, often with gouty proclivities. It most commonly declares itself about the age of puberty, but is by no means unknown in early childhood, or may very rarely manifest itself at or after middle age. Women suffer more frequently than men, the upper classes being specially vulnerable. Three things stand out prominently as the immediate causes of paroxysmal headache, namely, errors of refraction, disturbances of digestion, and mental worry. The most characteristic phenomena are flashes of light, blindness of one-half of the visual field, a small circle of sparkling colours, and a curious zig-zag spectrum of fortification pattern. These may occur in combination with other sensory signs, as tingling in the face, limbs, or tongue, temporary aphasia, or slight vertigo. Smell, taste, and hearing are seldom, if ever, involved. After these preliminary warnings, the headache comes on. The pain is of a peculiar boring character, and at first is of a unilateral character. When it has reached its maximum, it is partly relieved by retching or vomiting, and then gradually subsides under the influence of a sound sleep. During the attack, the urine is scanty, of high specific gravity, and is usually loaded with phosphates. There is always a degree of mental lethargy, and sometimes of mental confusion, which prevents the proper expression of thought, and may even go to the length of temporary incoherence of speech. The occurrence of one attack predisposes to others, which seem to be often determined by an unwise meal, menstruation, mental disturbance, or physical fatigue. Migraine may last throughout life. But in cases where it dates from an early age, it may disappear after the climacteric in women or after middle-life in men.

It is tolerably certain that the primary cause of migraine is some disturbance of function in certain parts of the cerebral cortex, causing a nerve-storm from sensory centres, similar to the periodic discharge of energy from motor centres, which probably account for epilepsy. It is still an open question whether the true explanation lies in a functional neurosis or a toxæmia to which the cerebral symptoms are secondary. The toxæmic theory derives some support from the fact that sufferers from migraine often give a pronounced gouty history.

As to treatment, Rankin urges attention to the condition of the eyes, and the necessity of correcting ametropia with suitable glasses. Diet should be simple, nutritious, and of moderate amount. Diluents should be taken freely: "a large tumblerful of piping hot water first thing in the morning, and again before going to bed at night, is a useful means of keeping the tissues free from accumulation of waste products." Other general measures include open air exercise, a daily bath, a Turkish bath once a week, and once a week an alterative aperient, such as a pill which contains one grain of calomel and four grains of rhubarb. Attention to the state of the teeth is most important. Metchnikoff's soured milk is most useful when dyspepsia is present. With regard to the attack itself, that may be sometimes averted by washing out the stomach with a weak solution of sodium bicarbonate when an attack is imminent. The severity of the pain may be often diminished by the application of a mustard plaster to the entire length of the spine. Of the numerous local remedies advocated none is more efficacious than menthol or chloral. The coal-tar derivatives do most good in relieving the pain. Antipyrin, phenacetin, antifebrin, pyramidon, and exalgin may be employed for this purpose, either combined with one another or exhibited with other remedies, according to requirements. SYDNEY STEPHENSON.

VI.—THE EYE AND THE TEETH.

(1) **Dor, Louis.—The eye-teeth.** (Les dents de l'œil.) *L'Ophtalmologie Provinciale*, avril, 1910.

(2) **Bonsignorio, Doctoresse.—Oculo-dental affections in nurslings.** (Affections oculo-dentaires chez les nourrissons.) *La Clinique Ophtalmologique*, 10 juillet, 1910.

(1) That there exists a relationship between the eyes and the first premolar of the upper jaw is an idea as old as the hills. **Louis Dor**, of Lyons, however believes that no particular tooth is specially connected with the eye, but rather that three or four teeth may be concerned. In other words, there is no particular "eye-tooth," although there are several "eye-teeth." Dor believes that the dental origin of ocular affections is extremely common. He includes in his list such conditions as accommodative asthenopia, blepharospasm, iritis, retinal phlebitis, retinal hæmorrhages, zona ophthalmica, and abscess of the lacrymal sac. During the course of a single year Dor observed at least sixty cases where the dental origin of an affection of the eye seemed to him to be clear. In 35 of these cases the patient failed to return. In 20 the exactitude of the diagnosis was shown by the disappearance of the eye symptoms after extraction of the offending tooth. In 5 cases patients continued to suffer, despite removal of the tooth. Most of Dor's cases appear to have been instances of ocular neuralgia, but paresis of accommodation and reflex contraction of the orbicularis were common manifestations. The author insists upon the reality of dental affections causing some cases of phlebitis of the central vein or of the ophthalmic vein, hypopyon-iritis, hæmorrhages into the sheath of the optic nerve, neuro-paralytic keratitis, herpes zoster, optic neuritis, abscess of the orbit, and sinusitis. He further believes in the dental origin of certain cataracts, certain unilateral glaucomas, and certain cases of hyalitis. SYDNEY STEPHENSON.

(2) **Bonsignorio's** article is mainly taken up with a recital of various primary and secondary reflexes. A comparatively small portion of it concerns two teething infants, who suffered from conjunctivitis and blepharospasm. ERNEST THOMSON.

OPHTHALMOLOGICAL INSTRUMENTS

MADE BY

E. B. MEYROWITZ,

LONDON, PARIS AND NEW YORK.

(1) The Ophthalmo-Diaphanoscope. Dr. Carl Hertzel.

(2) An electric light attachment for amblyoscopes.

(3) Adjustable fibre headbands.

The above instruments are briefly described below—further information will be gladly given on request.

(1) The Ophthalmo-Diaphanoscope, Dr. Carl Hertzel, consists of an 80 candle power electric lamp, surrounded by a water jacket. The lamp is ¾ inch in diameter and is of sufficient length to allow it to be inserted to the farthest extent of the oral cavity, while the terminals and water pipes are sufficiently remote from the patient to be quite safe from administering an electric shock.

The lamp is silvered at the end so that the light is reflected in a direction upward and backward toward the other end of the instrument. By reason of the concentration and reflection of the light, the transillumination value of the lamp is 100 candle power.

For the transillumination of the eye an entirely dark room is necessary and a black face mask with openings for the eyes must be used over patient's face.

After the cooling apparatus is working properly, the instrument is placed as high and as far back in the oral cavity as possible, bringing the source of the light at the back of the soft palate.

The current is now turned on, the pupils of the patient light up and it is possible to see without any practice, pupillæ, retina and choroid. The observer, to secure the best results, approaches the patient, eye to eye, until their eyebrows almost or quite touch. The observation of hypermetropic cases requires no aid, but if either the observer or patient is myopic, a concave lens should be held before the examined eye. The maximum illumination, as might be expected, is in the lower angle of the orbit, and for the best results the eye should be caused to rotate by having the patient direct his gaze in certain directions, so that the portion of eye to be examined may be brought into the strongest part of the field. The picture is seen erect, but an inverted image

may be secured in the regular way by means of a convex lens. The best illumination is obtained with the direct image. Enlargement of the pupil is not necessary.

Attention is directed to the fact that in this method there are no reflections and that an examination can be made without any special preparation in the *technique*.

Wholly or partly opaque foreign bodies are sharply defined and easily located, and if used during the operation for their removal the diaphanoscope is very useful, the field of operation being in no way circumscribed.

An attachment is made which enables the instrument to be used from without in the manner of the Sachs or Wurdemann transilluminator. The diaphanoscope is designed to operate on electric light circuits of 100 or 200 volts. In case of the latter voltage it is advantageous to use a regulating resistance.

(2) An electric light attachment for amblyoscope. This electric light attachment is supplied ready fitted to the Worth Black amblyoscope, or as a detachable fitting which can be adjusted to suit any amblyoscope. The control has a special feature not found in other makes, in that it permits either of the two lamps used to illuminate the pictures, to be individually dimmed or more brilliantly illuminated without affecting the other. This arrangement gives more latitude in illumination to a patient, and enables a smaller lamp to be fitted than that used in a system of control whereby as one lamp is dimmed the other automatically becomes brighter. The switchboard is of simple design, consisting of a rheostat fitted with two sliding contacts, working one on each side, and three pairs of terminals—one pair for battery and the remainder for the lamps. The fittings for attachment to the amblyoscope are made to slip on in place of the ordinary picture carriers, and comprise lamp-holder, reflector, and picture holder with spring release. The standard lamps are suited for a 4-volt battery, but other voltages can be fitted to order.

(3) Collapsible fibre headbands. A headband made of vulcanised fibre has many advantages. It is light, clean, and long wearing. As it is adjustable it is sure to fit any head with comfort. For carrying, it can be reduced to a diameter of 4 inches if necessary. It is fitted with a stem and ball, for carrying mirrors, loupes, etc. A further advantage it posesses is that when it is used to carry an electric lamp of any kind it perfectly insulates the wearer from any possibility of shock.

Enquiries are invited for the "Meyrowitz Bulletin," European Edition, Midsummer, 1910, which is now ready, and will be forwarded to any address.

VII.—HYALINE DEGENERATION OF THE CORNEA.

Rubert, J.—Hyaline degeneration of the cornea. *Arch. f. Augenheilkunde*, February, 1910, and *Archives of Ophthalmology*, July, 1910.

Rubert, of Kieff, has an important communication dealing with hyaline degeneration of the cornea, a very rare affection, of which two cases only are known in ophthalmic literature, namely, those described by Berlin (1887) and Gallenga-Luccarelli (1894)

The essential facts of Rubert's cases follow :—

Case No. 1.—A peasant, aged 22, suffered from trachoma in both eyes. The upper half of the right cornea was covered with a yellowish-white tissue, the surface of which was slightly nodular, lustrous, and somewhat elevated above the level of the rest of the cornea. The newly-formed tissue extended for about a millimetre over the limbus. It was of cartilaginous consistence. Its sensibility to touch was reduced. From the rest of the cornea it was sharply differentiated by a more or less horizontal line. V. fingers at 3·5 metres.

Case No. 2.—A girl, aged 18, had suffered from trachoma for some years, and for some months she had been conscious of a spot upon her right eye. The corneal changes closely resembled those described as present in the first case, but they covered more than the upper half of the cornea. V. fingers at 4·4 metres.

Case No. 3.—A woman, aged 20, was affected with trachoma, and, in addition, almost the entire upper half of one cornea was covered with a dirty-yellow growth, slightly raised above the level of the rest of the cornea. The first signs of the degeneration had been noticed ten years before.

Morsels were taken in each case from the surface of the new growth upon the cornea and submitted to pathological examination, the results of which were briefly as follows :—

Aside from minor histological differences, Rubert's cases showed in common a special tissue change under the guise of a homogeneous substance, occurring sometimes as a single structure and at other times as bands. In two of the cases this substance stained with the basic as well as with the acid dyes. The amyloid reaction was uniformly negative. The author differentiates this substance, which he regards as hyalin, from keratohyalin and colloid. The vessels were markedly thickened, and had become gradually converted into a structureless hyaline substance. The lumen was usually contracted, and often contained endothelial cells or their remains. They were sometimes obliterated by endovasculitis. Rubert believes that in his own cases the vessel walls should be regared as the starting point of the hyaline formation.

SYDNEY STEPHENSON.

VIII.—AN EPITHELIAL FILAMENT IN THE ANTERIOR CHAMBER.

Mackay, George.—An epithelial filament in the anterior chamber simulating a threadworm. *Transactions Ophthalmological Society U. K.*, Vol. XXIX, fasc III, 1909.

The case reported by **Mackay**, of Edinburgh, was that of a girl of 7 years, whose right eye presented slight irritability, associated with an appearance of a thread-like structure in the anterior chamber. The filament had first been noticed when the child was eight months old. In appearance it looked "as if a small threadworm had entered the anterior chamber from behind,

ascended the posterior surface of the cornea for a short distance, turned backwards, traversing the anterior chamber antero-posteriorly, but meeting the resistance of the iris, had hung its head downwards and given up the struggle." The thread was removed through a corneal incision, and was examined by Mr. A. E. Shipley, F.R.S., of Cambridge. It showed no trace of being a parasite. The tissue was imperfectly preserved, but sections pointed to the specimen being an epithelial growth. The author suggests that the epithelium was derived from the iris. Between the pillars of the spiral filament there was an area in which the epithelial layer of the iris was thinned, suggesting that there may possibly have been in embryonic life a separation of some cells which have gone to form this abnormal epithelial thread, much in the same way as a dermoid in the conjunctiva may be associated with a coloboma of the lid. The only case at all like this one which the author has been able to discover was described by Argyll Robertson at the International Ophthalmological Congress, New York, 1877, but this case was not operated upon, so that its nature remained undetermined.

ERNEST THOMSON.

IX.—INDUSTRIAL ACCIDENTS.

Snell, Simeon.—The President's Address delivered at the Seventy-sixth Annual Meeting of the British Medical Association. *British Medical Journal*, August 1, 1908.

The late **Simeon Snell**, in the first portion of his presidential address refers to the two previous meetings of the British Medical Association in Sheffield, namely, in 1845 and in 1876. Next, the Sheffield School of Medicine receives attention, and the president passes on to the consideration of the city as the "cradle of industrial diseases." Holland's investigations in 1843 showed that each principal department of the Sheffield trade had its own special health conditions and rate of mortality. The one pre-eminent for its destructiveness to life was fork-grinding. Snell's own work has been in connection with eye diseases, but in the course of his investigations he has made observations on the general health, as well as on the vision of his patients. As headings of his many investigations he gives the following.—(1) Diseases due to occupations involving prolonged use, or excessive strain, of the eyes and their muscles, such as nystagmus in coal-mining and in other employments. (2) Those due to occupations which involve the use of certain poisonous substances, such as di-nitro-benzol, bisulphide of carbon, etc. (3) A consideration of the effects on the eye of occupations involving exposure to excessive light, or heat, or both. (4) Injuries or accidents amongst grinders, iron and steel workers, coal miners, etc. The last mentioned (4) clearly showed that many of the accidents were preventable. From this Snell passes easily to the consideration of miners' nystagmus, in that the detection of fire-damp is a matter of vital concern to all engaged in a coal-mine, and miners suffering from this disease have a defective power of recognising the presence of fire-damp by the "cap" which appears on the lowered flame of the safety-lamp. For long it had been Snell's opinion that the apparent "dancing" of the safety lamps which forms such a prominent symptom of miners' nystagmus would be a hindrance to the delicate detection of the

"cap," and he set to work to prove his theory. The details of how he did so are given, and there is a page of coloured illustrations to show the varied appearances of the blue cap which appears on various flames with various percentages of gas. These details should certainly be read in the original.

Finally, the president pays a tribute to Lord Lister, to whose teaching the whole world is indebted. ERNEST THOMSON.

X.—EXOPHTHALMIC GOITRE.

(1) **Topolanski, A.—Remarks on the eye-symptoms of exophthalmic goitre. (Bemerkungen bezüglich der Augensymptome bei Morbus Basedowii.)** *Arch. f. Augenheilk.*, juni, 1909.

(2) **Jocqs, R.—A case of Basedow's disease seen early. Unilateral exophthalmos.** *La Clinique Ophtalmologique*, 10 janvier, 1910.

(3) **Ohlemann, M.—On eye symptoms in exophthalmic goitre. (Ueber Augensymptome beim Morbus Basedowii.)** *Arch. f. Augenheilk.*, April, 1910, Bd. 66, S. 43-56.

(1) **Topolanski's** remarks refer chiefly to injection of the veins over the recti muscles, as an early symptom of exophthalmic goitre, and to three cases of unilateral exophthalmos. PERCIVAL J. HAY.

(2) **Jocqs**, of Paris, reports the case of a neurasthenic woman who, though she complained of one eye becoming smaller, was really suffering from exophthalmos of the other. The usual signs were present, and Jocqs made the diagnosis from the one eye affected. A year later the other eye became prominent and the diagnosis was confirmed. Jocqs points out that Terson, in 1902, called attention to cases of this kind (*La Clinique Ophtalmologique*, 1902). The reviewer may mention that he has seen at least one case in which the classical symptoms were present in one eye only, but this patient never returned to the clinique for further observation. ERNEST THOMSON.

(3) **Ohlemann** describes his own symptoms of exophthalmic goitre. They began with a local dilatation of the anterior ciliary veins covering the internal recti, and œdema of the eye-brows, which spread to the forehead and temples. Then tachycardia and palpitation appeared, and the thyroid gland began to increase in size. The latter could not be palpated for some time, the increasing size of the gland only being made manifest by a desire of the patient to take off his collar. Profuse perspiration and loss of weight were the next symptoms. Small doses of potassium iodide (gr. $\frac{3}{4}$ bis die) improved matters a good deal and the perspirations had disappeared and the pulse had become much slower, when the first symptoms of ocular paralysis, viz., paresis and paralysis of the superior recti came on. Slight exophthalmos had been noticed some time previous to this. At no time was there any ptosis or any affection of the pupils or accommodation, nor was there any disturbance of colour vision. The remaining symptoms were tremors and general weakness, chorea and choreiform movements. As regards treatment, small doses of potassium iodide were at first most serviceable, then sodium iodide, sajodin and glidine which kept the pulse down to 68 to 78. Anti-thyroidin had a bad effect; it ran up the pulse to 110-120. When the iodine salts lost their efficacy, resort was had to the tincture of iodine, with good results, the pulse rate varying between 72-86. Milk diet, it was found, increased the frequency of the pulse considerably, and had to be given up. PERCIVAL J. HAY.

XI.—GUNSHOT WOUNDS.

(1) Hirschberg, J.—A case of blindness in both eyes following a shot in the temple. (Ein Fall von doppelseitiger Erblindung durch Schläfenschuss.) *Centralb. f. prak. Augenheilk.*, März, 1907.

(2) Ulbrich, H.—Two interesting gunshot wounds of the orbit (Zwei interessante Schussverletzungen der Orbita.) *Arch. f. Augenheilk.*, Juli, 1907, S. 12. Illust.

(3) Aubineau.—Gunshot wound. Loss of the right eye, traumatic neurosis (expert report). (Blessure par coup de feu. Perte de l'œil droit. Névrose traumatique (Rapport d'expertise). *L'Ophtalmologie Provinciale*, T. V., p. 190, décembre, 1908.

(4) Cords, Richard. — A case of shot wound into the temple with paralysis of the ocular sympathetic. (Ein Fall von Schlafenschuss mit Lähmung des Augensympathicus.) von Graefe's *Archiv f. Ophthalmologie*, Bd. 57, 1 Heft. April 19, 1910.

(1) The case which **Hirschberg**, of Berlin, reports is that of a young man who shot himself in the right temple, practically the only result of which was complete blindness. The wound of entry was situated 2 cm. from the outer canthus. The right eye is free from inflammation, and of good tension, the pupil maximally dilated. Ophthalmoscopically, a dull-red reflex becoming greyish on the temporal side. The left eye is prominent, soft, and inflamed, the cornea steamy, iris thickened, pupil irregular, with tears of the sphincter, and five synechiæ, vitreous red. The mechanism of the injury is supposed to be as follows.—The shot injured the right optic nerve, and thus caused the blindness. The left eyeball was pierced by the shot, and was seen radiographically lying inside the globe. The right eye recovered so as to be able to recognise hand-movements. The left one became shrunken. A. Levy.

(2) **Ulbrich** first describes the case of a man who shot himself accidentally in the right temple. There was no loss of consciousness, no pain, no hæmorrhage from the nose, but immediate proptosis. Ten days afterwards, the right pupil did not react to light, but the consensual reflex and the reaction to convergence were present. The eye was still proptosed. R.V. = p.l. Media clear. Fundus normal. In the left eye the ophthalmoscope showed some disturbance of the pigment and yellowish-white spots. These appearances extended from the macula outwards as far as could be seen. L. V. = 0·15 c + 0·75 = 0·45. Difficulty was experienced in localizing the bullet. The clinical signs seemed to point to the right orbit, in which severe inflammatory reaction began to suggest the desirability of removing the eye. On the other hand, the first X-ray photograph seemed to show the bullet in the left orbit. Repeated efforts at obtaining another photograph of the bullet failed, until photographs taken from the front or the side were abandoned and oblique photographs were tried, which proved successful and confirmed the first result.

In another case the patient also shot himself in the right temple. The bullet lodged in the right orbit and was removed along with the right eye. Five hours after the operation, vision in the left eye began to fail and eventually the patient became quite blind. Extensive changes occurred in the eye, which appeared to be partly inflammatory, partly hæmorrhagic in origin. P. J Hay.

(3) **Aubineau** publishes a medico-legal report on a case of a wound with a revolver bullet, which injured the right eye so seriously that it had to be enucleated, and also caused contraction of the socket. The injured man, who admitted excessive use of alcohol, subsequently complained of headache, vertigo, diminution of vision in the left eye, and deafness. On examination, no disease could be found in the left eye, which had a normal field and full vision with 0·50 D. sph, but there was some deafness. Aubineau considered that the troubles of which the patient complained were due to traumatic neurosis.

R. J. COULTER.

(4) The consequences of a revolver shot of the right temple were partial and transitory paralysis of the first branch of the trigeminus and of the abducens, together with complete paralysis of trochlear and sympathetic nerves, while the optic nerves and the big vessels escaped. The bullet could be localised by Roentgen-rays. The implication of the ocular sympathetic is rather interesting. The opinion formerly held that the sympathetic fibres are conveyed to the eye by the radix sympathetica from the carotid plexus to the ciliary ganglion and from here through the short ciliary nerves to the eye has now been generally dropped, as extirpation of the ciliary ganglion leaves the pupil unaffected, while section of the long ciliary nerves and of the first branch of the trigeminus nerve stops the dilatation of the pupil after irritation of the cervical sympathetic. It is most likely that the sympathetic fibres go from the carotid plexus to the ganglion Gasserii and then follow the first branch of the trigeminus to enter the eye by the nervus nasiciliaris and the long ciliary nerves. But it seems likely that only a portion of the sympathetic fibres pass the Gasserian ganglion, while the major part enter the nervus ophthalmicus directly. This would explain why extirpation of the Gasserian ganglion produces but rarely symptoms from the ocular sympathetic. R. GRUBER.

XII.—OPERATIONS.

(1) **Truc.—A case of double congenital ptosis cured by Motais' operation. (Ptosis congénital double ; opération de Motais ; guérison.)** *L'Ophtalmologie Provinciale*, février, 1907.

(2) **Parisotti.—Suture of the conjunctiva in sclero-corneal wounds. (Sutura della congiuntiva nelle ferite sclero-corneale.)** *Rivista Italiana di Ottalmologia*, September, 1908.

(2A) **Chevallereau.—On combined transverse keratotomy. (Sur la Kératotomie transversale combinée.)** *Bericht der Ophthalmologischen Gesellschaft*, Heidelberg, 1908 (Volume published in 1909, p. 287).

(3) **Ziegler, S. Lewis.—The radical treatment of lacrimo-nasal disease by rapid dilatation and allied measures.** *Journ. Amer. Med. Association*, June 18th, 1909.

(4) **O'Connor, Captain R. P.—Collapse of the sclerotic during cataract extraction.** *Ophthalmology*, July, 1909.

(5) **Rockliffe, W. C.—A danger arising from the use of plated instruments in ophthalmic operations.** *British Medical Journal*, July 3rd, 1909.

(6) Ziegler, S. Lewis.—Galvanocautery puncture in ectropion and entropion. *Journal Amer. Med. Association*, July 17th, 1909.

(7) Frugiuele.—Blepharoplasty for reconstruction of the inner half of the lower eyelid. (Blépharoplastie pour la reconstruction de la moitié interne de la paupière inférieure.) *Annales d'Oculistique*, septembre, 1909.

(8) Asmus, E.—Complete traumatic ptosis cured by Kuhnt's ectropion operation and Pagenstecher's sutures. (Totale traumatische Ptosis mit Ektropium geheilt durch Kuhnt'sche Ektropium-operation und Pagenstecher'sche Suturen.) *Zeitschrift f. Augenheilkunde*, September, 1909.

(9) Knapp, Arnold.—The operative treatment of glaucoma by cyclodialysis. *Journ. Amer. Med. Association*, September 4th, 1910.

(10) Frenkel, H.—The treatment of trichiasis of the upper lid by tarso-marginoplasty. (Traitement du trichiasis de la paupière supérieure par la tarso-marginoplastie.) *Recueil d'Ophtalmologie*, novembre, 1909.

(11) Theobald, Samuel.—Summary of the results obtained and features of interest in two hundred and fifteen consecutive cataract operations. *Johns Hopkins Hospital Bulletin*, December, 1909.

(12) Bourgeois, A.—The operative treatment of traumatic cataracts especially in accidents of employment. *La Clinique Ophtalmologique*, 10 novembre, 1909.

(13) Koster, W.—Further notes on the drainage of the lacrymal passages and on the formation of a permanent communication between the lacrymal sac and the nose. von Graefe's *Archiv f. Ophthalmologie*, Dezember 14, 1909.

(14) Calderara.—An operation to allow emptying of the orbit and saving of the globe. (Un processo operativo per le svuotamento dell' infundibolo orbitario con conservazione del globo.) *La Clinica Oculistica*, December, 1909.

(15) Fernandez, Santos.—On late intervention, or intervention at long intervals, in traumatic or congenital cataracts. (De l'intervention tardive, ou à grands intervalles, dans les cataractes traumatiques ou congénitales.) *La Clinique Ophtalmologique*, 10 décembre, 1909.

(16) Wittmer and Nagano.—600 extractions of senile cataract with peripheral iridectomy. (600 Extractionen von Alterstar mit peripherer Iridectomie.) *Archiv. f. Augenheilk.*, Bd. 66, April, 1910.

(2) Parisotti, of Rome, proposes to suture the conjunctiva in these wounds after a manner recalling Panas's operation for ptosis. He dissects up a square flap above the wound, and then loosens a bridge of conjunctiva below the wound, he passes the upper flap under the other, and secures it to the tissues. In this way, he securely covers the breach and gives opportunity for healing.

H. GRIMSDALE.

(2A) Chevallereau (Paris) describes an operation which can take the place of abscission or evisceration. The cornea is divided transversely, the iris pulled out and the lens delivered with a scoop. A bandage is applied but no sutures. The cornea gradually contracts, and a good stump is formed for an

artificial eye. The operation must not be performed upon any eye which might possibly excite sympathetic ophthalmitis. T. HARRISON BUTLER.

(3) **Ziegler**, of Philadelphia, insists upon the fact that the lacrymo-nasal canal is more distensible *in vivo* than it is in skulls, since the bones and tissues are more flexible. He estimates that at least 90 per cent. of the cases of lacrymal disease originate from the nose. Bacteria-laden secretions, he supposes, are poured out from the accessory sinuses on to the floor of the nose, whence they are conveyed by "reversed capillarity" into the lacrymo-nasal duct. The inflammation thereby produced may be superficial or deep, giving rise, on the one hand, to ulceration or thickening, or stricture, and, on the other, to periostitis or caries, or abscess. After these and other preliminary considerations, Ziegler credits Theobald with being the first to advocate the use of very large (0·25 mm. to 4 mm.) lacrymal probes, although such instruments were recommended at about the same time by Couper, of London. He then lays it down that probes of large calibre should be employed by forcible dilatation *ad maximum* at one sitting, without incision of the tissues, since that might interfere with the capillarity of the duct. Accordingly, he has devised (*Wills Hospital Reports*, January, 1895, I., p. 31), a lacrymal dilator provided with cylindrical body and oval point, and resembling in general appearance a double bayonet, two sizes of the dilator being attached, one to each end of a single metal handle. The entire instrument is made of forged steel.

Operation.—As a rule, local anæsthesia will suffice, although general narcosis may be necessary in nervous patients. The lower punctum is stretched with a special needle-probe devised by the author or with the smaller dilator itself, and the instrument is pushed along the canaliculus until its nasal end touches bone. The larger dilator is then inserted and pushed firmly through the nasal duct into the nose. It is allowed to remain in place for a moment (or longer if desired) and is then withdrawn. The minor accidents that may attend the operation include rupture of the punctum, ecchymosis and swelling of the lids, and nose-bleed. Patients should of course be warned not to blow the nose for 24 hours after operation, for fear of palpebral emphysema. Ziegler has personally never witnessed the formation of a false passage.

Indications.—The operation is particularly effective in cases of epiphora and obstruction arising from atresia, localised stricture, and general stenosis with thickening of the mucosa. Its most striking successes, however, are shown in ulcerative lesions of the cornea, especially those of recurrent type. It is performed by the author in wound infection following injury or operation (even after cataract extraction), and in many of these cases formalin (0.25 per cent.) is also injected into the anterior chamber. Rapid dilatation is also called for whenever the lacrymal passages are believed to be responsible for such affections as blepharitis, entropion, ectropion, and so forth.

Auxiliary measures include irrigation, incision, stricturotomy, and the insertion of styles or medicated bougies. The injection of bismuth paste, as employed by E. G. Beck in the treatment of tuberculous sinuses, is recommended by Ziegler. As material for styles, the author employs an alloy of tin and lead for the purpose, and he has devised a pair of forceps to facilitate the introduction of the style. Treatment of the nose should never be omitted.

SYDNEY STEPHENSON.

(4) **O'Connor's** patient had hypermature cataract (Morgagnian?) in both eyes. Both eyes were operated on at one sitting and presented the same phenomenon. After capsulotomy a considerable quantity of milky fluid escaped. There was no loss of vitreous. The cornea showed marked collapse

and "the movements of respiration were attended by alternate inversion and eversion of the cornea." The anterior chamber was irrigated with normal salt solution. Healing was rapid and uneventful, the wounds being closed, and external appearances normal at the first dressing two days later.

A. J. BALLANTYNE.

(5) **Rockliffe** (Hull) had the misfortune to lose an eye from acute panophthalmitis after cataract extraction. He was compelled to excise the eye four days after the cataract operation. Rockliffe believes that this untoward complication was due to a particle of plating (1.5mm. by 1mm.), detached from the de Wecker scissors employed in the course of the operation. He assumes that the fragment had dropped unseen into the anterior chamber during the iridectomy. SYDNEY STEPHENSON.

(6) **Ziegler,** of Philadelphia, strongly recommends the galvano-cautery as a means of treating mild cases both of ectropion and entropion. For this purpose he employed (1) a short and somewhat sharp galvano-cautery point, and (2) a lid clamp provided with a sliding catch and a straight upper edge*. As an anæsthetic Ziegler usually employs nothing beyond a 4 per cent. solution of cocaine applied to the conjunctiva, although in sensitive patients the cocaine may be injected beneath skin or conjunctiva, or general narcosis may be induced. The illustrations show how the operation is performed in ectropion and entropion. The point of the cautery is pushed through the

FIG. 3.—Lid clamp adjusted to case of ectropion, showing row of galvanocautery punctures on conjunctival surface.

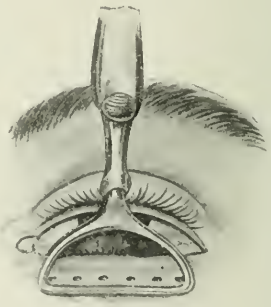

FIG. 4.—Lid clamp adjusted to case of entropion, showing row of galvanocautery punctures on skin surface.

"cartilage" of the lid and quickly withdrawn. The punctures are made 4 mm. from the lid margin, and are separated from each other by an interval of 4 mm. Naturally, they are made through the conjunctiva in ectropion and

*The galvanocautery is made by the Keystone Electric Co., Philadelphia, and the lid clamp by Joseph C. Ferguson, Jr., Philadelphia.

through the skin in entropion. The procedure, if necessary, may be repeated in the course of a few weeks. As the author remarks: "From one to three sittings will accomplish as much as a plastic operation would do." There is seldom any post-operative reaction. SYDNEY STEPHENSON.

(7) **Frugiuele**, of Naples, recommends the following method of blepharoplasty in cases in which it is necessary to remove the inner part of the lower lid.—(1) The entire thickness of the inner half of the eyelid is removed. (2) The external canthus is divided and the incision is prolonged obliquely upwards for about 3 c.m. (3) A horizontal incision is made parallel to the free margin of the eyelid and about 2 c.m. from it, and is prolonged to the temple, its external part being turned slightly downwards. This goes down to the bone and is freed so that it glides easily. (4) The remainder of the tarso-orbital ligament is divided. (5) A linear incision is made through the conjunctiva from the external palpebral angle to the eyeball. (6) The flap is pulled inwards and sutured.

By this means the entire outer half of the eyelid becomes the inner half, and is replaced by a flap of skin while the whole of the new lid is lined with conjunctiva except two small triangles at the extremities which heal by granulation. The author publishes photographs shewing the results obtained by this method in two cases. R. J. COULTER.

(8) The defect described by **Asmus**, of Düsseldorf, was caused by a wound from a goat's horn. There was complete ptosis, with ectropion, and prolapse of the mucous membrane. The deformity was remedied by three operations, which are sufficiently described in the title of the paper.

T. HARRISON BUTLER.

(9) **Arnold Knapp**, of New York, has performed Heine's operation of cyclodialysis in eighteen specially selected cases, and now reports the results. The cases fell into four groups, *viz.*: 1. chronic glaucoma (15 cases); 2. congenital glaucoma (1 case); 3. capsular adhesion to cornea (1 case); and 4. glaucoma secondary to neuro-retinitis with vascular changes and retinal hæmorrhages (1 case). Briefly, cyclodialysis failed in groups 2, 3, and 4. As regards the first and largest group, that of chronic glaucoma, it was successful in eleven of the fifteen cases, since tension was reduced for periods of observation that ranged from two months to upwards of two years. In the remaining four cases, the intra-ocular tension again became high.

In one favourable case a cataract developed, the opacity commencing at the posterior cortex, but it is impossible to say whether cyclodialysis was responsible for the complication. Neither vitreous disturbance nor detachment of the choroid was observed. The operation did not aggravate the condition, except for a macular hæmorrhage in one case, and an attack of acute glaucoma in two others.

Cyclodialysis is much easier to perform than a correct iridectomy-dialysis. Knapp considers the operation to be of value in advanced cases of chronic glaucoma, especially when iridectomy-dialysis has failed to reduce tension. At the same time, in his opinion, it cannot replace the classical operation of iridectomy or its recent modifications in cases of incipient chronic glaucoma.

SYDNEY STEPHENSON.

(10) **Frenkel**, of Toulouse, describes a case of trichiasis which he treated by transplantation of a flap of skin from the lids, as recommended by Truc and Villard. Villard insisted upon the necessity of carefully suturing the skin flap to the edges of the intermarginal incision. He used silk for the anterior sutures and catgut for the posterior, and took care, in order to avoid tension, to include only the superficial layers of the skin graft in the suture. Frenkel finds that stitches are unnecessary if the intermarginal incision is

made very deep and all hæmorrhage stopped before the skin flap is insinuated into the intermarginal groove. J. JAMESON EVANS.

(11) **Theobald**, of Baltimore, reports the results obtained in 215 consecutive cataract extractions, senile, traumatic, and complicated. In nearly all cases a small conjunctival flap was secured, while in all the section was made at the sclero-corneal junction. Iridectomy was usually performed. The capsule was freely opened by a long vertical incision crossed by a shorter horizontal one. Beginning with the second or third day, atropine (grs. 4) was applied to the operated eye as a matter of routine. In 115 of the cases (the others have been reported elsewhere) there were nine escapes of vitreous. Severe intra-ocular hæmorrhage occurred after smooth operation once, and led to hernia of the vitreous and practical loss of the eye. A "button-hole" iridectomy resulted in several of the cases. Discission of capsular opacity was performed in fifteen cases, and in one of these a second discission was necessary. There was a number of cases of mild iritis, and three in which the condition necessitated a secondary iridectomy, the ultimate visual result in these cases being respectively 20/100, 20/125, and 20/200. There were two cases of panophthalmitis. The results are classified by Theobald in the following way :—

SUMMARY OF RESULTS.

Successes $\left(\text{V.} = \frac{20}{CC} \text{ to } \frac{20}{XV}\right)$	95
Successes (V. not recorded)	8
Total successes	103
Partial successes $\left(\text{V.} = \frac{6}{CC} \text{ to } \frac{18}{CC}\right)$	6
Partial successes (V. not recorded)	1
Failures from suppuration	2
Failures from other causes	3
	115

SYDNEY STEPHENSON.

(12) From internal evidence this is an abstract or *résumé* of an article, by **Bourgeois**, of Rheims, appearing as an original communication. There is no reference to the original, so that one is unable to find it if wanted. ERNEST THOMSON.

(13) **Koster** reports on additional cases in which he has made successful use of his method of permanent drainage of the lacrymal passages (*vide* THE OPHTHALMOSCOPE, Vol. IX, p. 859). He has now introduced a slight modification (advised by B. Brand) which does away with the difficulty in extracting the end of the copper wire through the nose. He now uses a silk thread stiffened by impregnation with mucilago gummi arabici which he passes along the hollow probe until about 10-15 cm. of it lies free behind the concha within the nose. He then lets the patient breathe suddenly and strongly through one nostril while the other nostril is closed and the thread comes out without further ado. It is necessary to allow the thread to be well soaked first, so as to soften it, to withdraw the probe for about 1 cm. before introducing the thread, and to introduce this latter very slowly, to prevent it slipping into the pharynx. In a case where a false passage had been made into the middle meatus and the normal passage was no longer traceable, Koster

drained through the "*fausse route*" and found this treatment so successful that he intends doing it again in similar cases. R. GRUBER.

(14) Though Krönlein's operation was a real advance in the treatment of orbital tumours by operation, yet **Calderaro** thinks it was not in all ways satisfactory, and did not allow a large enough field for the thorough examination of the apex of the orbit. He proposes to attain this end by another route. – He makes a curved incision surrounding three-quarters of the orbital opening, at a distance of about an inch from the orbital margin. The incision begins in the mid-frontal line and ends, as seen in the illustration which accompanies the paper, about opposite the middle of the lower margin. The primary incision is taken down to the bone, the whole flap is raised as far as the bony margin, then the orbital septum and the external palpebral ligament are divided till the surgeon can pass his finger into the orbit and explore. If necessary, he cuts the muscles of the eye and the optic nerve as far back as possible and turns the whole flap downwards. If this does not give enough room, he can resect the external wall of the orbit. HAROLD GRIMSDALE.

(15) **Santos Fernandez** (Havana) emphasises the point that it is not often that many operations are required for cataracts in the young. One discission and patience are usually all that is required. ERNEST THOMSON.

(16) **Wittmer** and **Nagano** report upon 600 extractions performed by Hess according to his own method. They divide the cases into three series of 200. In all of them the vision was tested with Hess' new International test-types, a fortnight after the operation and with spherical lenses only. In the first series of 200 the visual results were as follows:—

V. 1·0—0·6 in	59 cases	= 29·5	per cent.
0·5—0·3 „	82 „	= 41·0	„
0·2—0·1 „	47 „	= 23·5	„
<0·1 „	12 „	= 6·0	„

In the second series:

V. 1·0—0·6 in	51 cases	= 25·5	per cent.
0·5—0·3 „	71 „	= 35·5	„
0·2—0·1 „	58 „	= 29·0	„
<0·1 „	20 „	= 10·0	„

In the third series:

V. 1·0—0·6 in	43 cases	= 21·5	per cent.
0·5—0·3 „	65 „	= 32·5	„
0·2—0·1 „	69 „	= 34·5	„
<0·1 „	23 „	= 11·5	„

Of the 600 cases, 55 obtained V. <0·1; 33 of these had a dense secondary cataract, and 21 were complicated with nebulæ, choroiditis, hæmorrhage, etc., the details of which are given. If these cases are excluded, the total result is as follows:—

V 1·0—0·6 in	153 cases	= 28·02	per cent.
0.5—0·3 „	218 „	= 39·95	„
0·2—0·1 „	174 „	= 31·87	„
<0·1 „	1 „	= 0·18	„

Extraction or discission of capsular remains was done according to the visual requirements of individual cases. As a rule V < 0.3 was regarded as an indication for performing this operation. Prolapse of the iris occurred in 4 cases = 0·66 per cent., which compares favourably with the results obtained by other surgeons, viz.:—

(1) Without iridectomy:—Hæssig 25 per cent., Hesse 8·8 per cent., Marshall 13·86 per cent., Schreigger 8 per cent., De Wecker 3·4 per cent.

(2) With complete iridectomy:—Hæssig 1·9 per cent., Hesse 3·3 cent., Knapp 8 per cent.

In 70 cases the degree of astigmatism was measured a fortnight after the operation. The results are shown in the following tables:—

0D in 6 cases	= 8·7 per cent.	V = 0·42
1—3 D „ 29 „	= 42·03 „	V = 1·41
3—6 D „ 26 „	= 37·14 „	V = 0·38
> 6 D „ 9 „	= 13·04 „	V = 0·28
Resulting Average 3·52 D in 70 cases		V = 0·38

The following advantages are claimed for the operation.—(1) A round, active pupil in the great majority of cases; (2) Slight degree of astigmatism; (3) Hidden coloboma; (4) Small percentage of prolapse of the iris; (5) A comparatively small number of operations for secondary cataract; (6) In cataract with glaucoma the peripheral iridectomy serves the purpose of complete iridectomy and allows of further medical treatment if necessary.

PERCIVAL J. HAY.

XIII.—XEROSIS OF THE CONJUNCTIVA.

Hepburn, M. L.—Xerosis of the conjunctiva and night-blindness. *Trans. Ophth. Society U.K.*, Vol. 30, Fasc. 2, p. 167.

This paper, by **Hepburn**, of London, dealt with the xerosis which occurs in young boys especially, usually associated with night-blindness, and he finds that cases are met with several times a year in large clinics. It is somewhat seasonal in its occurrence, being most frequently met with between May and September. The subjects are commonly well-nourished and strong. Levy had noted great pallor of the fundus, but Hepburn did not concur. Regarding the ætiology, the usual theory is that malnutrition is the cause, but the writer does not agree with this. He thinks that inefficient "metabolism" of the visual purple has some intimate connection with the night-blindness. The cause of this defective metabolism may reside in the effect of certain rays, acting either chemically or physically, and the same rays may have some deleterious action on the mucous glands of the conjunctiva. Levy, having studied the condition independently, agreed that malnutrition had no definite causative effect. The best treatment for the condition was the use of an oily preparation and keeping the eye bound up, so that light did not act on it.

Major Mould, in India, had seen night-blindness frequently and considered that it was the result of strong light acting on a person enfeebled by malaria. He found pallor of the fundus in all cases.

Stephenson had investigated the condition some years ago* and had found in many patients a state of matters similar to chlorosis. There was a slight contraction of the visual field for white and a transposition of the red and green fields, in some cases.

Johnson Taylor, of Norwich, had never seen the condition and wondered if locality had anything to do with its occurrence.

Harman had seen xerosis in blind persons. LESLIE BUCHANAN.

*See *Trans. Ophthalmological Society, U.K.*, Vol. XVIII.

XIV.—NEURO-RETINITIS IN CHLOROSIS.

(1) **Posey, William Campbell.—Neuro-retinitis in chlorosis, with report of a case.** *Trans. American Ophthalmological Society*, Vol. XII, part 1, 1909, and *Archives of Ophthalmology*, September, 1909.

(2) **Hawthorn, C. O.—Optic neuritis in chlorosis** *Brit. Med. Journal*, July 23, 1910.

(1) **Posey,** of Philadelphia, records the case of a girl, aged twenty-one years, of good family and tolerably good personal history, whose sight suddenly failed in the right eye, without any pain or other symptom. Examination of the eyes revealed double optic neuritis of an intense form, with great œdema of the retina in the right eye. "The veins in both eyes were enormously distended, while the arteries in the right were much reduced in size. The arteries in the left were of normal calibre. Both veins and arteries were tortuous, especially the former. No spontaneous venous or arterial pulse was demonstrable, or could be elicited by pressure. The veins were dark and full and hidden in places by the swollen retina. There were no hæmorrhages." The fields in both eyes were somewhat concentrically contracted, and there was a large eccentric scotoma in the right eye. R.V.—Fingers at 1 foot, L.V.=$\frac{6}{12}$. No other ocular changes. The patient was pale and badly nourished. Temp., 98; pulse, 108; blood pressure: systolic 120, diastolic 100. Blood: hæmoglobin 60 per cent., erythrocytes 4,790,000, leucocytes, 11,100. Heart: signs of mitral stenosis with slight insufficiency. Other systems practically normal.

Treatment.—Blaud's pill, gr. v., t.i.d. and rest, with some slight exercise in the open air.

A week later: hæmoglobin, 65 per cent.; erythrocytes, 4,710,000; leucocytes, 9,600. R.V.=$\frac{6}{6}$, L.V.=$\frac{6}{12}$. The eye-grounds showed marked improvement, the retinal œdema and swelling of the disc having largely subsided, and the size of the veins being much reduced.

In discussing the case, Posey states that there are now about twenty fully recorded cases in literature. It would appear, however, that he has overlooked the five cases reported by the reviewer in the *Lancet*, May 14th, 1904, all of which were of intense binocular type related above.

The author points out that the degree of anæmia in these cases is not necessarily extreme, although in some the hæmoglobin may sink to 20 per cent. In one case recorded by the reviewer it was 10 per cent. He also draws attention to the occasional association of papillœdema with hæmorrhages and degenerative spots and streaks in the retina, suggestive of albuminuria or cerebral tumour. Symptoms such as intense headache, vomiting and dizziness, and even localised convulsions have further led to the mistaken diagnosis of cerebral tumour, which, in one case, was only cleared up at the autopsy. In other cases diagnosis has been established more by the effect of treatment by iron and arsenic on the optic neuritis than by blood counts and general symptoms of anæmia.

The association of paralysis of the external rectus recorded by several observers is interesting, as pointing to the probable intracranial cause of the papillœdema. Stölbing ascribes it to a vascular sclerosis of the cavernous sinus; Hawthorne ascribes both signs to intracranial thrombosis. Ballaban also ascribes the optic neuritis to thrombosis which he locates in the central vein, whose endothelium has probably become diseased. Dieballa and

Schmidt are agreed that the papilloretinitis is the result of toxæmia, the toxic products being generated by deglobulisation, the latter being aggravated by physical strain and menstruation. Dieballa considers physical exercise in chlorotics to be decidedly deleterious, and he has observed that menstruation lowers the percentage of hæmoglobin as much as from 8 per cent. to 10 per cent. Willbrand and Svenger believe the papillœdema in chlorosis is due to increased intracranial pressure, as well as to changes in the retinal vessels—lessened elasticity and degeneration of the intima. Cushing and Bordley's findings with regard to the mechanical effect of cerebral œdema on the eyes in nephritis tend to support this view. Should this view be established, the question of decompression operations would have to be considered should sight be seriously threatened. The author, however, is inclined to attribute the changes in the eyeground primarily to the altered condition of the blood, but is at a loss to explain why such extensive and unusual changes should complicate an anæmia of so moderate and not uncommon degree.

J. JAMESON EVANS.

(2) **Hawthorne**, of London, casts doubts upon the accuracy of the statement, recently made in an editorial paragraph in the *British Medical Journal* (16th July, 1910, p. 157), to the effect that cases of optic neuritis in chlorosis are "probably far from uncommon." So far as his personal experience goes (and he has made a point of examining the fundus oculi of every patient who has fallen under his notice for many years), he is unable to number more than six instances of the association between optic neuritis and chlorosis. Hawthorne further deals with intracranial thrombosis as the cause of neuritis in these cases.

SYDNEY STEPHENSON.

XV.—PHLYCTENULAR DISEASE.

(1) **Czerny, Ad.—The Exudative Diathesis.** *Jahr. für Kinaerheilk. u. phys. Erziehung*, November 31st, 1909, and *British Medical Journal*, April 23rd, 1910 (epitome).

(2) **Weekers, L.—The pathological anatomy of ocular phlyctenulæ.** (Anatomie pathologique des phlyctènes oculaires.) *Académie de Médécine de Belgique*, 25 juin, 1910, ref. in *La Clinique*, 30 juillet, 1910, p. 587.

(3) **Lafon, Ch.—On the pathogeny of phlyctenular ophthalmia.** (Sur la pathogenie de l'ophtalmie phlyctenulaire.) *Archives d'Ophtalmologie*, juillet, 1910.

(4) **Rosenhauch, Edmund.—Upon the connection between phlyctenular inflammation of the eye and tuberculosis.** (Ueber das Verhältnis phlyctänulärer Augenentzündungen zur Tuberkulose.) v. Graefe's *Archiv für Ophthalmologie*, August 2, 1910.

(1) **Ad. Czerny** describes under the name of the exudative diathesis a constitutional anomaly the symptoms of which have been well-known for years but which in former years were classed with other affections, especially tuberculous affections, under the title of scrofulous. One of the earliest signs of the exudative diathesis is the occurrence of milk scab, the cause of which was at one time considered to be due to a fault in the quality of the milk, especially a too great percentage of fat. This view was not altogether without

justification, but it was not the whole explanation ; the food unsuited for the child made obvious the constitutional anomaly which had been hitherto latent. Predisposed children will show signs of the exudative diathesis almost without intermission for the first ten years of life if they are kept to an extreme and one-sided diet of which milk and eggs are the chief constituents. The food has, however, only an indirect influence, as is shown by the fact that the abnormality shows itself especially in the first year of life, for the greater part of which the normal child brings with it so great a supply of reserve material that it needs food to a great extent only to supply the necessary warmth and fluid. The author considers that an abnormality in the power of fat metabolism is probably the cause of the symptoms. In addition to milk scab, the following conditions are characteristic of the first six months of life—thrush, "scurf," geographical tongue ; sometimes also catarrh of the nose, the pharynx, or the bronchi. The symptoms may begin almost from birth, or the condition may not declare itself until the end of the first year, sometimes in connexion with teething, or with vaccination ; indeed, such children are liable to bring vaccination into discredit, and in families in which it is hereditary, it may be well to defer vaccination until the end of the second year. Moreover, the signs of the diathesis – as, for instance, eczema—if they are already obvious, are frequently made worse as a result of vaccination. Certain other infections appear to have a similar result, and especially measles and florid, complicated tuberculosis. The signs of the diathesis may appear after a cutaneous or subcutaneous application of tuberculin, and are then often looked upon as a specific reaction, but this view, according to the author, is not justified. That the symptoms of the exudative diathesis when they are present in a child with tuberculosis are distinct from tuberculosis is shown by their disappearance with suitable diet. Another fact which goes to prove that the condition has nothing in common with tuberculosis is that von Pirquet's tuberculin test has shown that comparatively few children are infected with tuberculosis during the first year of life, the period during which the signs of the exudative diathesis most commonly declare themselves. Czerny looks upon the abnormality as definitely hereditary, and the fact that often no history is obtainable is explained by the disappearance of the condition, and failure on the part of the patient even to remember it by the time adult life is reached. In tuberculous families the exudative diathesis is not more frequently nor more strikingly encountered than in others, but it is often observed in families with a nervous history. The condition is so widespread that its incidence can only be compared with that of rickets. The subject needs more investigation. The author still holds the view, which has met with considerable opposition, that phlyctenules are a sign of the exudative diathesis, and not of tuberculosis. He looks upon the status lymphaticus or the lymphatic constitution as a sign of the diathesis in its most severe form, and finds that it yields to the same dietetic treatment. Since it is found that overfeeding with milk and eggs is especially liable to give rise to the symptoms, these constituents of the diet must, in children affected, be reduced to a minimum in accordance with the age of the child. At the same time fattening on carbohydrates is to be avoided as being still more harmful ; flesh food has no bad effect on these children. If the primary cause of the condition is to be considered in the light of practical experience, it would seem that in the exudative diathesis there is a congenital defect which concerns especially those tissues which make possible the great variations in the water contents of the organism ; the greater the amount of water the more obvious the diathesis—a fact which explains the frequency of the

symptoms in the first year of life, and also explains why a diet which increases or diminishes the water contents of the body brings about corresponding changes in the manifestation of the condition.

(2) The first exact knowledge of the structure of phlyctenulæ dates from the appearance of Iwanoff's communication in the year 1860. **Weekers**, of Liege, has examined microscopically twenty-seven cases of phlyctenulæ in different stages of their evolution. He describes three stages: infiltration, ulceration, and cicatrisation. During the period of infiltration, the lymphatic vessels are abundant, and the capillaries are so dilated as to give a spongy aspect to the phlyctenule. The nodule then becomes infiltrated with polynuclears. But Weekers has not succeeded in finding giant cells of the Langenhans type. There is vasculitis and peri-vasculitis. The epithelium becomes thickened and infiltrated with numerous polynuclears and lymphocytes. It pushes prolongations into the depths of the phlyctenule. The epithelial changes, described minutely by Weekers, cause him to regard the ocular phlyctenule as absolutely different from the vesicle of eczema. In the ulcerative stage, the epithelium becomes thin and vacuolated; the base of the ulcer is occupied by leucocytes enrolled in fibrin. In the period of repair the epithelium proliferates exuberantly, so as to form prolongations towards the surface and in the depths; the leucocytic infiltration gives place to cicatricial tissue.

The evolution of ocular phlyctenulæ is the same in the adult as in the child. The microscopic structure of syphilitic papules is absolutely different. Despite many researches, Weekers has been unable to find the tubercle bacillus in phlyctenulæ. Weekers identifies ocular phlyctenulæ with tuberculides, both from the clinical and the structural point of view. SYDNEY STEPHENSON.

(3) According to **Lafon**, of Périgueux, by most practitioners it is admitted as a dogma that phlyctenular ophthalmia is a tuberculous manifestation, although the fact is far from being proved. Recent experiences with sporotrichosis, however, should warn us to be circumspect, and not to connect a crowd of lesions and syndromes with tuberculosis. The origin of the conception is easy to explain. Formerly, ocular phlyctenules were looked upon as manifestations of "scrofula." As a result of Villemin's memorable work, it was shown that certain scrofulous lesions were of tuberculous nature. The generalisation was speedily made that the two words "scrofula" and "tubercle" were interchangeable and synonymous terms. But before long the discovery of the tubercle bacillus made us lose sight of the *terrain*, which had once claimed so much attention, and from that moment scrofula became "a modality of tuberculosis occurring among lymphatic children" (Escherich). To this new point of view, however, objections were not wanting. It was shown that certain so-called "scrofulous" manifestations were in reality due to heredo-syphilis; that others had a gastro-intestinal origin; that still others were due to exogenous causes; and so forth. With regard to ocular phlyctenulæ, it was pointed out that they differed completely from tuberculous lesions of the conjunctiva by their symptoms, course, and structure; by the constant absence of the Koch bacillus; and, lastly, by the impossibility of reproducing them experimentally. In reply to these objections, it was suggested that the phlyctenulæ were probably provoked by dead bacilli, or by toxins carried in the circulation, whence the terms "tuberculides," "scrofulides," "toxi-tuberculides," "para-tuberculous lesions," etc. The positive reaction to tuberculin, so often elicited in children suffering from phlyctenular disease, possesses no value as a proof of the tuberculous nature of the eye lesions. In point of fact, it merely indicates the existence, somewhere in the patient's body, of a tuberculous focus, and does not prove that the phlyctenulæ are of

tuberculous or of toxi-tuberculous origin. Because two lesions are concomitant, it by no means follows that one is certainly the cause of the other. By some writers, phlyctenular mischief has been attributed to lesions of the nasal mucous membrane, to saprophytes of the conjunctiva, to adenoid vegetations of the naso-pharynx, to "nits" in the head, and so forth.

The possible connections between tuberculosis, on the one hand, and phlyctenular ophthalmia, on the other, are three in number.—1. The phlyctenulæ are caused by tuberculous infection. Bacillosis, however, cannot explain all the cases, since phlyctenular disease "may be observed equally in children whose health is of the rudest possible condition, among whom all local tuberculous infection may be surely eliminated, and to whom we are not at liberty to apply the word 'scrofulous' (Morax)." 2. The two lesions spring from the same general cause: phlyctenulæ then, are a manifestation of the *terrain*, which favours the birth and the development of tuberculosis. 3. The two lesions are independent one of the other. In the third case, the pathogeny of phlyctenular ophthalmia may be understood in two ways: (a) the ophthalmia owns an extrinsic cause, and is a local lesion. Against this point of view must be placed the negative result of bacteriological researches, the localisation of the lesion to the squamous portion of the mucous membrane, and the clinical associations of the condition, such as the commonly associated eruption on the skin of the face, slight febrile disturbance, and trivial intestinal disturbance. (b) It may be the manifestation of a particular general state, which is connected with infection, with defective nutrition, and which Czerny has recently described under the name of the "exudative diathesis" (*Jahr. für Kinderheilkunde*, XX, 1909, p. 529).

Lafon recognizes a complex and a simple group of cases of phlyctenular mischief, the latter of which he arranges in three catagories.—1. Patients who are already tuberculous when the eye trouble appears. The cause of the ocular disturbance in this class must be the toxin of the tubercle bacillus. 2. Patients free from a family or personal history of tubercle, in whom the eye mischief comes on after an infective malady, such as measles, scarlatina, whooping cough, varicella, blennorrhagia, etc. 3. Patients free from tubercle and who appear to enjoy robust health when the ophthalmia makes its appearance. Lafon has studied the third class with particular attention. Although these children are said to be well by their parents, yet a little enquiry elicits the fact that they are affected with gastro-intestinal troubles (overlooked or ignored), as the result of injudicious feeding. For example, their bellies are big and often tender on pressure; diarrhœa frequently alternates with constipation; and the stools are offensive and include slime or even false membranes. Although the children sleep much, they rest little. Their flesh is flabby. The tonsils are big and adenoids are present. Angina and bronchitis are common amongst them. Their delicacy causes them to contract, one after another, the whole series of the childish infective diseases. In sum, then, these patients suffer from chronic auto-intoxication of gastro-intestinal origin, and systematic examination often discloses the existence of a dilated stomach and of confirmed enteritis. Lafon supposes that the digestive disturbance provokes the formation of toxic substances, which, passing into the circulation, produce the symptoms of intoxication. The organism tries to rid itself of the toxins in various ways, and in doing so, provokes the formation of ocular phlyctenules. The symptoms of irritation, the photophobia, the lacrymation, and the habitual association with other lesions of the same origin as impetigo of the face, give to phlyctenular disease the characters of a process of unloading (*décharge*), of a lesion of fixation.

Is phlyctenular conjunctivitis always to be looked upon as the manifestation of a gastro-intestinal auto-intoxication, or may it be provoked by all the other toxins, whether they proceed from an acute infection or from tuberculous lesions? The author, in endeavouring to answer his own question, expresses his belief that our eclecticism should in each case lead us to search for a particular cause.

The position, as conceived by Lafon, may be summed up in the following way.—If phlyctenular ophthalmia may in certain cases be attributed to toxins derived from a virulent bacillary focus, in many other cases, on the contrary, the two lesions depend upon digestive disturbances. At the same time that it provokes the formation of phlyctenulæ, gastro-intestinal auto-intoxication diminishes the resistence of the organism against other infections. It creates a soil favourable to the evolution of all micro-organisms, notably of the tubercle bacillus. The conclusion is that phlyctenular ophthalmia may be due to different causes, amongst which gastro-intestinal auto-intoxication occupies the preponderating place. The corollary obviously is that when this is the case we should institute proper dietetic measures, as well as appropriate general treatment. SYDNEY STEPHENSON.

(4) As the result of his experiments, the conclusions reached by **Rosenhauch**, of Krakau, are as follows:—

1. Positive results with the Moro test make it probable that there is a focus of tuberculosis, open or latent, in the patient's organism.

2. The Moro reaction was positive in 96 per cent. of the patients suffering from phlyctenular inflammation of the eye.

3. The tears and the secretion of the normal conjunctival sac possess scarcely any opsonic power.

4. The opsonic index for staphylococci in secretion from eyes with phlyctenulæ varies, being dependent upon the condition of disease in the eye. On the contrary, the opsonic index for tubercle bacillus remains unchanged.

5. In the blood serum of men affected with phlyctenular inflammation of the eye neither the opsonic index for the s. aureus nor that for tubercle bacilli varies under the influence of changes in the disease of the eye.

6. If an eye with phlyctenular inflammation is irritated by the instillation of dionine, so the opsonic index of the blood serum varies neither for staphylococci nor for tubercle bacilli, which speaks against the existence of those microbes in the phlyctenulæ.

7. Phlyctenulæ histologically exactly resembling those of human beings can be produced experimentally in the eyes of animals in the following ways: (*a*) in tuberculous animals, after irritation of the conjunctiva, by the introduction of yellow staphylococci or, more rarely, of other micro-organisms, as the Morax-Axenfeld diplobacillus. (*b*) In healthy animals by the subcutaneous injection of tuberculin and the introduction into the conjunctival sac of yellow staphylococci, either living or dead, or of their toxins.

8. No phlyctenulæ were produced in healthy animals after (*a*) the simple introduction into the conjunctival sac of yellow staphylococci or other microbes; (*b*) in tuberculous animals when no pathogenic micro-organisms were placed in the conjunctival sac, and when the absence of such was proved before the experiment was made.

9. In phlyctenulæ, examined histologically and bacteriologically, we find neither tubercle bacilli nor staphylococci nor any other kind of micro-organism.

10. The conclusion follows that phlyctenular inflammation of the eye is due to the conjoined action of internal and external causes. The former include the toxins of the tubercle bacillus, and the latter the toxins of other micro-organisms, chiefly those of the s. aureus. SYDNEY STEPHENSON.

XVI.—MALINGERING, INDUSTRIAL QUESTIONS, etc.

(1) Parisotti.—Traumatic amblyopia. An important case of simulation. (Ambliopia traumatica. Caso importante di simulazione.) *Rivista Italiana di Ottalmologia*, Feb.-Mar., 1906.

(2) de Lantsheere.—On the necessity of a complete examination of the eyes in ocular injuries. (De la nécessité de l'examen complet des yeux dans les traumatismes oculaires.) *Recueil d'Ophtalmologie*, septembre, 1907.

(3) Bettremieux.—The original condition with reference to industrial accidents, particularly accidents to the eyes. (L'état antérieur à propos d'accidents du travail et en particulier d'accidents oculaires.) *La Clinique Ophtalmologique*, 10 et 12 août, 1908.

(4) Dransart.—With regard to the previous condition. (A propos de l'état antérieur.) *L'Ophtalmologie Provinciale*, février, 1909.

(5) Johnston, Wilson.—Industrial eye injuries. *Ophthalmology*, July, 1909.

(6) Charles, J. W.—The determination of damages from the ocular examination after an injury. *American Journal of Ophthalmology*, October, 1909.

(7) Dehenne, A.—The measurement of the visual acuity from the point of view of accidents during employment and of fitness for the public services. (La mésure de l'acuité visuelle au point de vue des accidents du travail et de l'aptitude aux emplois publics.) *La Clinique Ophtalmologique*, 10 novembre, 1909.

(8) Terson, A.—Temporary traumatic opacities of the lens and their medico-legal importance. (Les opacités traumatiques passagères du cristallin et leur importance médico-légale.) *Ann. d'Oculistique*, novembre, 1909.

(9) Bourgeois, A.—Monoptotypes for the determination of the visual acuity in expert reports. *La Clinique Ophtalmologique*, 10 décembre, 1909.

(10) Gaupillat.—Malingering. A red test-type with letters reversed. *La Clinique Ophtalmologique*, 10 juin, 1910.

(1) This case is chiefly interesting because the malingerer had adopted a method by which he was able to simulate contraction of the visual field and repeat practically identical findings.

The man had received a violent shock, so that he fell, striking the right side of the head; the wound in this region was sewn up, and healed by first intention. Later, he complained of loss of vision. There was nothing in the external or deeper parts of the eye to account for such loss, but the visual field, tested repeatedly, showed contraction of a definite shape and degree. Parisotti, of Rome, noticed, however, a circumstance, slight in itself, in connection with this examination. The patient kept his arms under the table. At the next examination, he requested the man to place his arms on the table, and was convinced by his manner that there was something to disquiet him in this request. The field on this occasion was by no means identical with that

previously found. As the patient complained that the position with the arms on the table was uncomfortable to him, he was allowed to place them again out of sight, and the field again taken. Now, it again presented the former characteristic shape. During this examination, Parisotti, under the pretence of dropping a chart, took the opportunity to look at the position of the patient's hands; he found the man engaged in counting his pulse. Feeling sure that this had something to do with the regularity of the charts, he examined once again, and this time was careful to move the test object more rapidly than before, the field then showed greater contraction. Convinced now that there was fraud, he taxed the man with it, and he confessed that he counted a certain number of beats after seeing the object before he replied to the investigator. In this way he preserved the regularity of the defect.

The case is of considerable interest and importance, as showing how difficult it is to eliminate fraud. HAROLD GRIMSDALE.

(2) **de Lantsheere's** paper was read before the first Belgian National Medical Congress at Brussels in May, 1907. He draws attention to the necessity of recording every detail of the case, and gives a short account of the lesions—traumatic or non-traumatic, ancient or recent—which may affect the separate anatomical structures which go to form the eye and its adnexa. These are briefly tabulated at the end, and the list may prove a useful help to general practitioners and others who are only occasionally called upon to make medico-legal reports. J. JAMESON EVANS.

(3) This is a medico-legal paper by **Bettremieux**, of Roubais, which discusses the question as to whether the original condition of a workman who has been injured should be taken into consideration when determining compensation. ERNEST THOMSON.

(4) An article in which **Dransart**, of Somain, deplores the present jurisprudence of the Court of Cassation with respect to awards made to workmen injured in the performance of their work. The Court does not take into consideration the state of the individual before the accident. Several extraordinary and unjust (to employers) examples of the Court's decisions are given. BERNARD CRIDLAND.

(5) **Johnston**, of Spokane, classifies the eye injuries prevalent in his district into four groups.—(1) From the handling of high explosives; (2) from the bursting of locomotive gauges; (3) from accidents occurring in mills, foundries, machine shops, and the building trades; and (4) from accidents occurring in agriculture. In the first class extensive laceration and destruction is the rule, but in some cases vision is almost destroyed merely from peppering of the cornea with fine particles. Both eyes are apt to be involved. Vision may be restored or improved in some cases by removal of a traumatic cataract. The injuries of Class 2 are not so common. The author had 19 in 297 eye injuries, and in no case were both eyes injured. One is apt to find corneal wounds, prolapse of iris, and traumatic cataract. The greatest number of injuries belong to his third group, which includes injuries by particles of steel, emery, or sand, and pieces of wood or iron, as well as lime burns. Injuries of the fourth group are usually produced by straw, beards of wheat, etc., and most of them are infected. In the diagnosis of a foreign body in the eyeball, if the ophthalmoscope does not give help, the x-rays should always be employed.

The prognosis, where there is a penetrating wound, depends on the nature of the object which produced the injury. It is naturally more favourable in group 3, where the injury is often due to steel or iron, than in group 2, in which the wound is often due to copper, glass, or stone. Johnston has seen

serious mental symptoms, as mania, melancholia, etc., result from impairment or loss of vision.

Considered from the economic point of view, the most serious loss of earning power results from the injuries of groups 1 and 2. The majority of these injuries are preventable and the author advocates certain precautionary measures. Treatment is briefly considered. A. J. Ballantyne.

(6) This case, by **Charles** of St. Louis, was one of traumatic hysteria, diagnosed from the fact that in one eye there was concentric narrowing of the field and in the other a reversal of the red and green limits. The lawyer was advised to accept damages for severe nervous shock rather than to fight on account of any supposed permanent lesion. Ernest Thomson.

(7) **Dehenne's** article, in which he introduces a new test type based rigidly on the size of the retinal images, with its tables and plotted-out curves, must be read in the original. One specially interesting point, however, may be mentioned, namely, that his "decigrade" test type is divided into two portions, the first from 0° to 5°, in order to determine the fitness or unfitness of a workman, and the second from 5° to 10°, for higher acuities demanded by the public services. Ernest Thomson.

(8) **Terson** refers to a case previously recorded by himself, in which a woman of 30 years of age, following a violent blow of a fist, developed in the anterior part of her lens a large number of greyish horizontal striæ, separated by transparent intervals, which cleared up in a week, leaving the eye normal. He also records the case of a man, aged 26, who received a blow from a cow's horn on his right eye, which tore the conjunctiva and caused an iridodialysis below, and a slight synechia. Six weeks after the accident, the vision of the eye was 1/10, and, on examination, the whole lens was found to be nebulous and filled with innumerable white spots. In the fundus there were several whitish stripes, which, while differing from a typical choroidal rupture, were regarded as due to forcible distension of the eyeball. The lens cleared up by degrees, and ten weeks after the accident, it was perfectly transparent, while the eye had distant vision of 5/10, and could read the smallest print without any glass. Terson considers that the condition is due to irregular imbibition of fluid by parts of the lens, and that in medico-legal cases care should be taken not to give a definite opinion about opacities in the lens until time has been allowed to see if they will clear up. The chief points with regard to prognosis are.—(1) The opacity may vanish with meteoric rapidity or take as long as two months to disappear gradually, completely, or partly. (2) The injury is usually caused by blunt force, but may result from small perforating wounds which leave little or no trace. (3) Young lenses are more likely to regain their transparency than old ones. (4) Even after clearing up, the lens may again become opaque as a result of the same injury.

The question as to the amount of compensation payable under French law in case the opacities partly clear up is discussed. R. J. Coulter.

(9) **Bourgeois**, of Rheims, deserves the thanks of those who may have to do with malingerers for the simple, portable test type which he has introduced for the special purpose of puzzling the individual who has determined beforehand how much visual acuity he will admit.

Four white celluloid cubes of 4·5 centimetres side fit compactly into a little box. Each of the six sides of each cube has a single letter, figure, or broken ring painted on it. In the corner is a fraction indicating the visual acuity at 2·5 metres, the distance at which the test is made. The letters, etc., follow no rule of size so far as the examinee is concerned, and the cubes being held in the examiner's hand can be so quickly rotated and shown that the examinee is unable to "orient himself," to use a favourite French expression.

It is difficult to imagine any more simple and convenient method of puzzling the malingerer who admits any visual acuity at all as to the amount of vision he is allowing himself; and, of course, if vision be denied, other methods of detection may be employed. The box of four cubes is manufactured by Giroux, Paris. ERNEST THOMSON.

XVII.—ANAPHYLAXIS OF THE EYE.

(1) **Stanculeanu, G., and Mihail, D.—The pathological anatomy of the ophthalmo-reaction.** *Klin. Monatsbl. f. Augenh.*, April, 1909; Graefe's *Archiv f. Ophth.*, Bd. LXXIII, i. Heft., Dezember 14, 1909; and *Journal de Phys. et Path. Gén.*, janvier, 1910.

(2) **Mihail, S.—A research upon the phenomena of anaphylaxis of the conjunctiva obtained by horse-serum.** Thesis of Bucarest University, 1910.

(1) **Stanculeanu and Mihail,** of Bucarest, have studied the histo-pathological evolution of the ophthalmo-reaction to tuberculin from the moment of the beginning of the reaction to its end. For this purpose they have chosen four patients affected by sero-fibrinous pleurisy, without temperature, who gave a reaction in an equal manner to the instillation of 1 per cent. tuberculin. They afterwards made sections from the inferior *cul-de-sac* of the conjunctiva. From the first patient the tissue was removed after seven hours; from the second, after twenty hours; from the third, after thirty-two; and from the last, fifty-six hours after the instillation of tuberculin. Examining the secretion of the conjunctiva they followed at the same time the cytology of the secreted liquid and the histo-pathological state of the conjunctiva. Their results are:—

A. **Seven hours afterwards** they could notice, from a clinical point of view, a vascular injection of the conjunctiva, shedding of tears, but no secretion.

Histological examination showed: (1) a hypersecretion of the conjunctival epithelium; (2) an œdema of the superficial layer of the stroma and an infiltration of great mononuclears, the most of them being in full activity of secretion. The *cytological examination* of the conjunctival liquid showed the full microscopical field spotted with polymorphs, epithelium, and few polynuclears.

B. **After 20 hours,** from a clinical point of view, one could see a concrete secretion in the shape of a thin strip hanging by one extremity from the lacrymal caruncle, while the other was swimming freely at the bottom of the inferior *cul-de-sac*.

The *histological examination* was as follows: (1) An exaggeration of secretion of epithelial cells; (2) a beginning of lymphoid flow and of *mastzellen* in the stroma of the conjunctiva. *Examination of the conjunctival secretion* showed, besides the epithelial cells already described, a much greater number of polynuclears.

C. **Thirty-two hours later** the clinical aspect was the same as shewn in the preceding case. The *histological examination* of the sections showed an aspect of a sponge and a great diffuse infiltration of the epithelium with polynuclears. In the superficial stroma one could see an enormous lympho-cyte flow. *Examination of the conjunctival secretion* showed as in the preceding case, but with a predominent evidence of polynuclears.

D. **After fifty-six hours** the reaction of the conjunctiva decreased. One could observe a small concentrated secretion with an irregular aspect in the inferior *cul-de-sac*. The *histological examination* of the excised fragment showed an excavation of the epithelial layer through the cavities filled with polynuclears, some of which were in a stage of intra-cellular digestion. The *cytological examination* of the secretion showed the same cellular elements as in the preceding cases, but much more degenerated, and still more polynuclears.

The *histological analysis* of these four cases of conjunctival reaction to tuberculin leads the authors to these conclusions.—The instillation of 1 per cent. tuberculin on the conjunctiva of consumptive people has a specific action on each of the two layers of the conjunctiva, namely, the epithelium and the stroma. By its action on the epithelium, it produces an exaggeration of its state of secretion, and, moreover, this secretion is specific in the sense that the secretion and accumulated liquid in the epithelium exercised an attraction only on the polynuclears, which were digested by the secreted liquid. This attraction increases from the beginning until near the end of the conjunctival secretion, when the attraction of the polynuclear ceases and the infiltration diminishes quickly. By its action on the superficial stroma, the tuberculin exercises an exciting action on the great mononuclears, which normally infiltrate the stroma and put them into the state of exaggerated secretion. This secretion is also specific, attracting with it the lymphocyte flow, which is of a shorter period than the polynuclear.

G. Stanculeanu.

(2) **Mihail,** of Bucarest, has taken as a starting-point of his work the accidents referable to the cure of the eyes by serum which he has noticed in the Eye Hospital in Bucarest, in consequence of repeated injections of horse-serum, made for therapeutic purposes, in cases of keratitis parenchymatosa. He has studied experimentally the appearances of anaphylaxis of the eye. In his experiments he used rabbits, which he put into the state of anaphylaxis by a first injection of horse-serum of 3 cm. under the conjunctiva. Afterwards, he noticed that the animals did not show any visible signs if no other injections were made, but he remarked the fact of the increase of volume and of toughness of the preauricular gland, which reached the maximum on the fifteenth day. From that moment he remarked an inverted evolution which disappeared 25 days after the first injection. When he studied the duration of the incubation and the appearances of anaphylaxis of the eyes he found a minimum of seven days incubation. Making intermediate injections between the first and seventh day, he remarked that they did not influence in the least the reaction which set in after the seventh day. Daily repeating the injections of serum under the conjunctiva, he obtained nothing before the seventh day, but from that day he obtained regularly anaphylactic accidents which grew more and more intense. Wishing to see the duration of the anaphylactic sensibility he found that it lasted for forty days after the injection under the conjunctiva. Pursuing the examination of the clinical aspect of the anaphylactic appearances of the eyes, he noticed that they follow a cyclic evolution, having as a starting point at the very moment of the anaphylactising injection a maximum which appeared on the second day after that injection, and lasted two days, and a decrease by *lysis* of these accidents. In consequence of the anaphylactising injections, he remarked the œdema of the conjunctiva, which, after twenty minutes had very vascular surface. This œdema had a tendency to increase, and was hidden under the eye-lids, pushing them outward, and giving to the eye an exophthalmic aspect. Thirty minutes after that injection, on the cross-section of the vessels, miliary hæmorrhagic spots appeared,

which disappeared after four hours, and mixed with the bottom of the red-violet of the conjunctiva. After those four hours they disappeared, and the surface which was eroded, cicatrised rapidly. The eye-lids became œdematous, but as to the other parts of the eye there was nothing to be observed. The eye watered and on the bottom of the lacrymal glands of the conjunctiva one could see a curdled secretion. The inflammation of the preauricular gland became more intense in consequence of the anaphylactising injection. Because it appeared after the first injection the author asks himself whether these glands do not play an important part in the genesis of the sensibilisine; which, after having had its offspring in the greatest part of their inner part, could be spread on the whole organism, bringing it into the state of anaphylaxis. The author attributes the swelling of the pre-auricular gland which appeared on the second day after the injection under the conjunctiva to the union of the sensibilisine formed in this gland with anti-sensibilisine. He believes that the general anaphylactic accidents would appear quicker than after the seven days which are necessary for the local incubation. Examining the temperature of the animals, he noticed that it is not influenced by the first injection under the conjunctiva, but that the anaphylactising injection makes the temperature fall after one hour from 0·6 to 0·8 degrees. Two hours later, the temperature rises from 0·6 to 0·8 degrees above the normal. The author thinks that the serum injections under the conjunctiva not only bring into reaction the conjunctiva, but the whole organism, and the general reaction is done quietly. Studying the relations which the local and general appearances have to one another, he states:—

(1) The anaphylactic state appeared with the same facility in consequence of injections under the conjunctiva as it appeared in consequence of injections made in the ordinary way.

(2) A new injection of serum under the conjunctiva which was made within the anaphylactic period of the conjunctiva made those local appearances more intense. If this new injection under the conjunctiva is done after the local accidents have totally disappeared the anaphylactic reaction of the conjunctiva is silent.

(3) Multiplying the injections he did not succeed in making the anaphylactic accidents more intense.

(4) The anaphylactic conjunctival liquid is in itself a poison which makes it capable of causing anaphylactic accidents of itself, general as well as local, even with absolutely normal animals.

(5) The serum of an animal which has suffered the anaphylactic *choc* shows an anaphylactic power which is rather intense, and which can give local and general accidents of anaphylaxis.

Then, passing to the study of the conjunctival anti-anaphylactic vaccination he comes to the conclusion that among the procedures employed the procedure of vaccination by scattered and warmed serum of Besredka was the only one which had a prophylactic value but its action would be a passing one. Studying under the microscope the conjunctiva which had reacted he noticed two hours after the anaphylactising an irritated state of the stroma characterized by the tendency to the formation of numerous miliary abscesses under the epithelium. Thirty-six hours after the anaphylactising injection he remarked:—(1) An irritation of the epithelium which was more exaggerated than in the preceding case, consisting of increased secretion and a tendency for the multiplication of the epithelium. (2) An exaggeration of the irritation of the stroma shown by a double infiltration by polynuclears and lymphocytes. The microscopic examination of the anaphylactic glands

showed him that these do not present any more lymphatic follicles under their capsule, and the whole gland does not present any more the areolar aspect of the normal gland but the aspect of a very contracted net of which the meshes are full of lymphocytes.

Trying to give a general point of view for all these microscopic examinations, he concluded that in this biological reaction two cellular elements act a principal part—the polynuclears which appear in the conjunctiva and in the glands very quickly, and the lymphocytes which appear later on. While the polynuclear flow is more intense and lasts a longer time the lymphocytary flow is more reduced and of a shorter duration.

Making a comparative analysis of the anaphylactised conjunctiva with the tuberculariscd one, he noticed between them a clinical and histo-pathological identity, and Mihail concluded that *the ophthalmo-reaction is nothing else but a local ocular appearance of anaphylaxis.* G. STANCULEANU.

BOOK NOTICES.

Die Behandlung der Kurzsichtigkeit. Von PROF. DR. J. HIRSCHBERG, Geh. Med. Rat. in Berlin. Berlin and Vienna: Urban and Schwarzenberg. 1910, pp. 89. Price, 3 marks.

In 1904, Prof. Hirschberg wrote an essay on the treatment of short-sight at the commencement of the twentieth century, which being founded on his own experience, and found useful, is reproduced in pamphlet form with such additions as five more years of practice have been able to supply him with. Short-sight, as defined by the old Greeks, was "good vision for near objects, imperfect for distant." It is a condition which exists in many animals, as in insects, fish in water, and in the frog; whilst many animals, as birds and the larger mammals, are, on the contrary, long-sighted. The normal eye of man possesses the power of accommodation, and can both examine near objects and contemplate the most remote. In infancy there are scarcely any who are short-sighted; but amongst older children and educated adults, short-sight is not uncommon. Cohn's useful researches, published in 1867, made upon 10,000 children in Breslau, showed that in the village schools the proportion of myopia was 1·42 per cent., in the middle (board) schools 10 per cent. and in the gymnasia 26 per cent. The results of enquiries made through friends of 200,000 persons, gave nearly the same results. Tscherning, examining the folk of the neighbourhood, found 2 per cent. of myopia amongst peasants; in simple traders 5 per cent., but in students 32 per cent. These statistics clearly show the influence of continuous attention bestowed upon near objects. But the highest degree (over 9D) of myopia follows other laws, since it occurs in the young and is more equally distributed over all ages, and it would seem, therefore, that there may be an additional cause—namely, hereditary tendency or predisposition. Prof. Hirschberg describes the rationale of lenses for the relief of short-sight, but points out that strong glasses are not always well-borne, producing headache and general malaise, symptoms that disappear when the glasses are disused. In cases of low myopia (—0·75 to —3D) the Professor orders full correction in the young; but after the age of 50 or 60, the full correction is not required owing to gradually advancing presbyopia. With medium degrees of myopia (from 3·5 to 6 diopters) full correction is only wanted for distant objects; a lower power of half the strength, or more, for near objects, or a Franklin's lens with double

focus may be used. Stronger glasses of 8 or 9 diopters should not be used persistently, but a second weaker pair should be employed for near objects, whilst the weaker pair can easily be supplemented by a pair of pince-nez. Myopia requiring—6—8D as a rule at the age of 40-50 is associated with visible changes in the fundus.

Amongst the complications of myopia may be mentioned affections of the cornea, which, whilst generally clear, sometimes becomes hazy, and flecks and nebulæ after scrofulous inflammation, as well as the pencil or brush-like arrangement of vessels indicative of inherited syphilis. In high myopia the cornea may be attenuated to the thickness of a sheet of paper, so that when such patients, over 50 years of age, become affected with cataract, and are operated on, the greatest care is necessary to obviate the rolling in of the edges of the wound, and the Professor prefers to perform the inferior section, or to apply a suture. The lens in high, but not first in the highest degrees of, myopia shows, if a lens is used behind the mirror, in patients of 30 or 40 years of age, vesicles or droplets either distinct or arranged in groups, situated close behind the anterior capsule, even though the patient can still see to read small print clearly: so that the indications of subsequent trouble are apparent long before they express themselves in the wedge-shaped striæ. Cataract is more frequent and appears earlier, as in the fortieth and fiftieth years, than in those of normal sight. The vitreous is often fluid, and its escape should be avoided when extraction is performed, since it may easily lead to detachment of the retina and to loss of vision. Amongst 1,600 cataract extractions, Professor Hirschberg operated on 33 cases of high myopia (10-30 diopters). The sexes were equal in numbers. 14 cases were operated on by flap operation with normal pupil, 8 cases with iridectomy at the time of operation, 11 cases with preliminary iridectomy. No escape of vitreous was recorded, nor was there any case of wound infection, nor of detachment of retina. In high myopia slight shifting of the lens is frequent.

The disturbances of the vitreous in myopia, cloudinesses, and pearl necklace-like bodies are common. These have a breadth of $\frac{1}{20}$—$\frac{1}{200}$ mm. and a length of 1-4 mm. They lie close to the retina and throw shadows upon it, their distance from the retina being at most from $\frac{1}{4}$—4 mm. Larger bodies, resembling flies, are often seen, and are thought to be due to inflammatory processes, but they are not amenable to anti-phlogistic measures. Rest of the body and of the eyes, the avoidance of bright lights, the wearing of dark glasses, and the use of mineral waters are the best means of aiding their removal. They probably owe their origin to stretching and tearing of the tissue of the hyaloid that takes place in high myopia. The aspect of the fundus generally, of the optic disc, and of the crescent are fully given. According to Stellwag no crescent existed in 10 per cent. of cases of high myopia. Schnabel found that 74 per cent. of cases presenting a crescent were myopic. A. v. Graefe found that the most common defect in amblyopic eyes was myopia. Amongst 1,000 amblyopic eyes 420 were myopic. Myopia, it is to be remembered, is not a disease produced by inflammation, that it has been so held has been productive of much mischief. Keeping in dark rooms, application of leeches, hot pediluvia with mustard, cupping glasses and other like measures, especially when practised on women, have produced neurosis in the most marked degree. The crescent, *per se*, causes little disturbance of vision, it is only as the crescent or ring encroaches on the fovea centralis that the sight begins to be impaired. As life advances external squint appears, followed by micropsia, which is occasioned by the stretching of the retina, so that the image of a letter, for example, which at a reading distance falls on five rods of a normal eye, only covers three rods of the myopic eye. Thus, certain

letters in type fall out. The Professor's plan of treatment is at once and rigorously to suppress all needlework. The child in whom evidence of advancing myopia is obtained, should be taken from school and be taught by the ear for a long period, and in both sexes all close or near work should be suppressed as far as the physician can. By this means the progress of the disease can be arrested. In addition, general corroborative or strengthening remedies should be prescribed. Subconjunctival injections of common salt may be prescribed, though he has not much faith in them, they at least do no harm. The quantity injected should be a gramme of the physiological solution (15 drops of a 0·6 per cent. solution) every second or third day. He objects to the injection of perchloride of mercury, even of the strength of 1-6000.

The most serious consequence of myopia is detachment of the retina, of which it may be said the fact is irrefragable, the theories of its origin doubtful and contested, the treatment uncertain, the recovery rare. It is the cause of 4 per cent. of blindness in the short-sighted. In Hirschberg's own practice, from 1889 to 1903, there were 180 cases of detachment in a total of 6,320 patients admitted into his clinic, and there were 120 cases amongst the out-patients numbering 48,780. There were thus 300 cases of detachment in 338 eyes. 38 cases were bilateral (11 per cent.), 142 the right eye was affected, 119 the left. In 178 patients 203 eyes, or 60 per cent., were myopic. Patients having myopia under 6 D numbered 22, from 6-12 D 82, over 12 D 67. The detachment in myopia is often the result of a very slight blow or strain. It is often overlooked. It is properly an affection of the vitreous. As regards treatment of myopic detachment, Professor Hirschberg asks, "Is it possible to cure an affection which is never cured spontaneously?"

As treatment for detached retina, the Professor gives rest in the recumbent position, the internal use of potassium iodide, the wearing of dark glasses, and records cases where a puncture was made through the sclerotic with a Graefe knife, so as to divide the detached retina, and good results followed. When cataract was formed the lens has been removed and improvement has been observed. A difficult operation, suggested by Dr. L. Müller, is described, in which the external orbital wall is temporarily resected vertically, the external rectus exposed and two ligatures passed round the belly of the muscle, and the muscle divided between them. Then the inferior oblique muscle is divided at its anterior third to gain space. When this is done a portion of the sclerotic 8-10 mm. broad and 20 mm. long is excised. The edges of the wound are brought together with 5 needles, taking great care that the choroid is not wounded. Dr. L. Müller exhibited 7 cases thus treated, one of which was a case of detachment of the retina, and he proposed to adopt the same proceeding in the treatment of myopia. The Professor refers to Dr. Schiess' atropin treatment of myopia, which he finds useless. He has seen many cases where division of the external recti was performed, a method of overcoming the muscular asthenopia supposed to exist and to be the cause of the outward squint of myopes strongly recommended by v. Graefe and Zehender, by whom 80 cases are reported with only very doubtful benefits. Hirschberg remarks in a note, "It is worthy of notice that v. Graefe's *Abhandlungen* are no longer regularly quoted," and, he pathetically adds, "are perhaps . . . . no longer read." At any rate the operation has proved futile. "Can," he asks, "the removal of a piece of the sclerotic be practised to reduce the length of the myopic eye?" The astonishing proposal has been made of removing a narrow segment of the sclerotic from the equator of the eye, and has been adopted by Fukala, who on this account has been lauded to the skies and compared to such masters as Helmholtz and v. Graefe! but it has been well remarked by a French writer, "ce qu'on exaggère, diminue." The removal of the trans-

parent lens, which Donders regarded as a reprehensible proceeding, has been practised, and he asks what has Fukala, who recommends the operation, effected by it, answering somewhat cynically, "many myopes have their distant vision improved, but many . . . . are blinded." At Moscow, where he read a paper on the subject, Hirschberg could not induce him to give statistics! It is only allowable in the highest degree of myopia, 15 D. and above. A myope with a length of 30 mm. becomes, if the lens is removed, capable of seeing distant objects, and is, so to speak, emmetropic. Before his lens is removed he will require a —18D. If his myopia is less than this, 11D. for example, the removal of the lens will more than compensate for his myopia and will necessitate the use of a +5D for distant objects and as there are no powers of accommodation left a much higher, perhaps a +10D, for near objects. Hence the myope will do well to be content with a — 10D. Moreover, the operation of extraction in the young is not so good as in the more advanced in age, and, further, there is the danger, long after the extraction of the lens in the myope, of detachment of the retina. Evidently Prof. Hirschberg is not prepossessed in favour of the operation. He performs it rarely, and only in very bad cases, and warns the patient he runs considerable risk. He gives a table of the fore and after vision in 24 cases. The rules that he lays down in his ordinary practice are, that in moderate degrees of myopia and with moderate school work, the patient should not read voluntarily more than for half-an-hour, and in school work should rest, if only for ten minutes, after half-an-hour's work. With regard to music, only children who have a natural taste for it should be taught. Where myopia is in process of development all school work should be interdicted for as long as even a year, and they should live in the open. The essay is a valuable one. HENRY POWER.

Treize planches pour la mesure de la Vision élémentaire. Par le docteur ED. PERGENS. 1909. Bruxelles.

Each of the thirteen cardboard plates, has a name, which gives some indication of its contents; as 1. Locus, 2. Angulus, 3. Apertura media, 4. Apertura penultima, 5. Apertura extrema, 6. Ambitus, 7. Separatio prima, 8. Separatio Secunda, 9. Separatio tertia, 10. Mistura, 11. Separatio linearum, 12. Numerare, 13. Lineæ.

In use, a plate is fixed to a white surface of at least a square metre in size. The eyes are examined singly. The patient stands at a distance from the plate outside the limit of distinct vision, and advances till he is near enough to distinguish the figure on the plate. This distance is noted, and constitutes a measure of his visual perception. Some of the plates, as for instance Nos. 3-6, contain different forms of a similar test It is suggested that they may be used together. Some will serve as a double test; *e.g.*, No. 12, which consists of a row of black squares with equivalent intermediate spaces, may be used (a) to determine the distance at which it is recognised that the row is not a continuous line, and (b) to note the distance at which the patient can count the squares.

The plates are published by H. Lamertin, 20, Rue du Marché-au-Bois. Brussels.

Die Hemophilie in der Augenheilkunde nebst Bemerkungen zur Durchblutung der Hornhaut. (Hæmophilia in Ophthalmology.) Von A. VOSSIUS. Halle a S.: Carl Marhold, Verlagsbuchhandlung. 1910. p. 20. Price, ninepence.

In this pamphlet Dr. A. Vossius has collected three cases of hæmophilia

that he has found recorded in ophthalmic literature. We should have expected that they would have been more numerous. Little more is known of the pathology of the disease than was known to Grandidier and Schonlein in 1877, who attributed it to abnormal blood on the one hand, and, on the other, to some defect in the structure of the walls of the vessels. It is curious, according to Grandidier, that among 630 bleeders in 194 families, 584 were males, and only 46 females. Women can transmit the disease, but themselves escape. Surgeons, dentists and midwifery practitioners not infrequently meet with cases of hæmophilia, but they are rare in ophthalmology. One case is recorded by Zirms, where hæmorrhage occurred after iridectomy performed on both eyes in a patient 62 years of age. The globes were hard and full of blood six days after the operation. Grandidier mentions two cases occurring after squint operation. Oteava met with one case after squint operation. More or less hæmorrhage occurred in a girl of 17 years of age, lasting for $8\frac{1}{2}$ months; amaurosis and atrophy of the globe followed. Shirley met with a fatal case of hæmorrhage after scarification of the conjunctiva. Kuhnt describes a case that occurred after excision for trachoma. The author had, like Zirms, a case of persistent hæmorrhage after iridectomy. Purtscher, in the course of 1000 extractions, had two cases of expulsive hæmorrhage, one of which occurred in a bleeder. HENRY POWER.

CORRESPONDENCE.

While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

MAJOR GIDNEY'S OPERATIONS FOR CATARACT AT THE OXFORD OPHTHALMOLOGICAL CONGRESS.

To the Editor of THE OPHTHALMOSCOPE.

Sir,

There was a most interesting programme arranged at Keble College, Oxford, by the Master of the Oxford Ophthalmological Congress and his able colleagues, at which I had the good fortune to be present. Much instruction, work, and pleasure was, I am sure, derived by all who were there, whilst the inaugural dinner at which the various toasts were given and responded to created a feeling of the deepest loyalty and pride in the hearts of all those who listened to the Chairman (Sir Anderson Critchett), the Vice-Chancellor of Oxford University, and Professor William Osler. The latter gentleman showered upon members of the Congress pretty compliments that fired one with the desire to join that good-looking band of workers who combined all these qualities for good work and relaxation as well which tend to bring out the physiognomical characteristics so clearly and cleverly elucidated by this able observer of human character and frailties.

The most interesting feature of the programme was in the operating theatre, where every eye was keen to observe what was passing under the hand of the various surgeons. These were representative of British, Foreign, and Indian art in the handling of the instruments for various operative procedures on the eye. The one that excited the most critical attention was what is described as "Smith's" or "Jullundur Smith's" operation for cataract. This operation, if we follow the steps and requirements and particular *technique* employed by Lieut.-Col. Henry Smith, most naturally calls forth

a full examination into its merits. Major H. A. J. Gidney, I.M.S., who undertook the operation of expressing the lens whole in its capsule in three cases, was not equipped with the minor details of "Smith's operation." He did not, for instance, sit on a stool two feet high, and the table therefore was not 2 feet 7 inches either. He used, as he informed his hearers, Desmarre's retractor to lift the upper lid from off the eyeball with the aid of his able assistant, instead of a "lid-hook" as described by Vail, of Cincinnati. Yet the operation was as finished and as gentle and as neat as could be expected in any hands. In the matter of results, it is perhaps too early to judge until we see at least a hundred operations performed and the full statistics drawn up. Yet it has proved to all who saw it, that the essentials of such an operation can be fully safeguarded, producing excellent results as an operation without those other details prescribed by Smith. It only convinces us all, that every operator is not built in the same manner as Smith who is a big type; whereas, if the small type of nimble and scientific operator of small stature were to sit in the same sized stool over a table as prescribed, he might be very uncomfortable all the time, sacrificing *technique* and skill for the purpose of assuming a sitting position which did not suit him. Major Gidney is not the nimble man of small stature referred to (he is by no means small), yet he took up the standing position by preference to tackle his cases, and he came out triumphant with the Desmarre instead of the "lid-hook." If imitation be the height of flattery, I would rather assume the attitude best suited to my requirements. That attitude which Major Gidney took is the one assumed by the majority of us in eye cases, and I assumed it in the days when I first took up the cataract operation by eclectic methods and extracted nuclear, striated, and black cataracts, without capsulotomy in several cases.

Major Gidney, I maintain, has adhered to a method in almost all its *minutiæ* that I had adopted in the early nineties when my work on the *Methods of Operating for Cataract* was published (1894). He safeguards the essentials in precisely my method, and I venture also to say that his was an eclectic method, for we saw his cases together and one of them, he declared, not to be quite fit for Smith's operation. It was his first case, recognized as an eye which might prove troublesome during operation. He noticed a small cornea, in addition, I—from my experience of the difficulty of such cases for extraction while in their capsules—noticed that, in consequence of the small cornea, it was also flat, and made the anterior chamber look shallower than in normal corneæ, and I said so at the time. I also predicted success in every case by this method, for I have followed Major Gidney's *technique* and skill from his earliest days of lifting the cataract knife, and saw him deal with sheep's eyes before he undertook these operations; in his hands, therefore, all three eyes were safe, but, as predicted, the first was difficult to tackle. What happened? The lens was unwilling to be delivered. It came to the mouth of the wound, gazed on us, and retired. Why did it retire? Because Major Gidney could not keep up pressure without the danger of rupturing the hyaloid; hence he relaxed his pressure. He tried again; the same thing occurred. He tried a third time; there was a repetition, but with a gentle side-to-side movement of the hook over the cornea at the lower edge of the lens, and the gentle pressure of the spoon to receive the lens at the posterior lip of the incision, the lens presented further. Sufficient—*just sufficient*—pressure had been employed, and the cataractous lens fell gently over the spoon into the outer canthus and slithered on to the patient's right temple. Some thought the hyaloid would be ruptured and vitreous escape. Yes, this is

the idea some cases do give, and difficulties are only overcome by the right degree of pressure in the right place, with a patient who is thoroughly good and under proper control. There are risks, and at times the operator almost holds his breath for fear of an escape through the slightest wrong degree of pressure. Is it, I say again, worth while (for every operator, even fairly skilled and not the finished operator) in all cases, therefore, to extract a lens whole in its capsule and thereby incur risks as regards both your patient and your own reputation? This particular case illustrates the point in my asking the question in page 408 of the June issue of THE OPHTHALMOSCOPE, in my article on "The Expression of the Lens whole in its Capsule in Cataract Extraction." Will not the results by the eclectic method, be shown to be better in the hands of the majority of operators in the matter of *escape of vitreous*, which is the main feature of the operation under examination? I reiterate what I have already said in the article named above. "It is always worth while trying to do so (extracting the lens in its capsule) without lacerating the capsule, and if it comes away *easily*, well and good; if not, you prick the capsule." Note I have said *easily*. Major Gidney's attempts were not easily performed, for there was a moment of suspense while this was proceeding. All credit to him for having accomplished it, as he was determined to show that in the hands of a man who had done 500 or more cases of cataract expression and extractions, this was a possibility, and the scale turned in his favour.

His second case was easily expressed; so much so, that an onlooker suggested that the capsule must have been ruptured internally with an escape of the lens. I think that I am justified in saying that this is only apparent and not real, for I was quite near Major Gidney, and saw distinctly what occurred. It is possible for an operator while transfixing for the linear incision to touch the anterior capsule with the point of the knife depressed towards the centre of the pupil, just before transfixing. But this was not the case with Major Gidney. It was a clean transfixion, and being a proper sized one, the gentlest touch expressed the lens which was the smallest of the three operated on.

It will have been noticed in Major Gidney's remarks with reference to the case where he declared the pupil fully dilated, and the iris well tucked in, and affording no room for an iridectomy, and therefore he proceeded to undertake the operation without iridectomy. No sooner the linear incision was made, the operator's mind changed, and he did an iridectomy. I only mention this to show how the merits of a case, as you go on from step to step, demand the eclectic, and therefore it is the most scientific. You might prognosticate certain features of the case; but you cannot absolutely do all you make up your mind to do until you are face to face with your case at the moment of your operation, and at any particular stage of it, you might have slightly to alter your mind. It only speaks more highly for your science to do whatever is best for your patient without running unnecessary risks. A perfect pupil is doubtless the best; but if, after the linear incision, you find it is better to do iridectomy you do it, and forthwith abandon your former intention.

The last case operated on by Major Gidney had calcareous deposits on the anterior surface, and, as a rule, these are found on the anterior capsule. A very curious feature has been noticed by me in two classes of these cases of calcareous deposit: (1) those cases where there is a perfectly dull white opacity to be seen with two, three, or more calcareous deposits of a duller white than the background, and which usually indicate a fairly hard lens which exerts a high degree of pressure on being delivered. This was the case in Major Gidney's patient: so much so, that as it passed the edge of the iris it

slightly strained upon it, and I observed the operator shake his head a little from side to side, as if indicative of an anticipated slight delay in the delivery of the lens. (2) Those cases of calcareous deposit of a finer grain and more evenly scattered over the anterior capsule, with a bluish-white membranous opacity as the background. What is found in these cases is a membranous cataract. I have seen several in India, and diagnosed them before operating. It is necessary to do so. Why? Because it simplifies the operation very greatly, for, instead of a linear incision of large or small size, you simply make the usual small incision of an iridectomy, insert the fine iris forceps through the lips, closed, and gently seize the membrane in the centre and draw gently, when it comes away, like a fine silken fold, through the opening, leaving a dark black centre for the pupil, and, as a rule, excellent vision.

G. H. FINK, Major I.M.S.
(Retired.)

Queen's Gate Chambers,
52A, Cromwell Road, South Kensington,
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ORIGINAL COMMUNICATIONS.

THE ADVANCE IN OPHTHALMIC SCIENCE IN THE PAST TWO DECADES.*

BY

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TWENTY years ago, a medical man in the enjoyment of fulness of years and powers and possessions, said to the writer, "Don't go into ophthalmic science. It's interesting enough but since it has been put upon a mathematical basis it is practically a closed science; it has been worked out almost to a finality. Go into some science that is opening up, such as bacteriology or biochemistry. In that direction lie the great things that are yet to be achieved in medicine." That he was sane and gifted with prevision is evidenced by the manner in which the medical world to-day hangs upon the last word from the biochemists. But the writer has never ceased to be amazed at the elder gentleman's dictum that ophthalmic science was then worked out to a finality. He is therefore moved to bring before you at this time in more or less rapid review, the development within our own special science that has taken place in the past twenty years.

In the domain of anatomy we have learned much concerning the intricate structures of the lids, the capsule of Tenon, the orbital fascias and supernumerary muscles, the existence of a dilator muscle in the iris, the presence of pupillary as well as visual fibres in the optic nerve, the proper and exact mapping out of the optic and the pupillary tracts back of the chiasm, the anatomic relations of the various nerves governing the motility of the eyes, the presence of lymph channels in the orbit, and the newest ideas concerning the actual anatomy of the angle of the anterior chamber, as set forth by Arthur Thomson, professor of anatomy in the University of Oxford, England. If these are confirmed and accepted, they will go far to revolutionize our conception of the anatomy of the parts concerned in anterior filtration.

As to comparative anatomy we have gone far. The work of Lindsay Johnson in England and of Casey Wood in our own country alone will serve to explain many formerly obscure conditions because of our understanding of the anatomy of the eyes of the lower animals. The recent establishment of the *Journal of Comparative Ophthalmology* in Germany only serves to emphasize the importance of this phase of our work. Let us hope also that this development of ophthalmic science may throw some light into the dark subject of congenital anomalies of the fundus oculi, concerning which there remains so much speculation. Each individual worker sees so few of such conditions and the opportunities for microscopic section of such eyes are so rare that every such case should be fully reported and described, along with a color representation of the condition. But among the domestic animals such anomalies do occur, and under these circumstances microscopic study would furnish many fruitful *data*.

In the realm of physiology our science has made great strides. The exact relation of various cerebral centres to the visual act is now pretty well

*Inaugural address delivered at Cincinnati, Ohio, U.S.A., September 19th, 1910, before the American Academy of Ophthalmology and Oto-Laryngology.

established. No longer is the occipital lobe the only portion of the cerebral cortex thought of in relation to the eyes. The angular region, perhaps a small portion of the angulo-parietal region and a large expanse in the most forward frontal region, are now known all to exert their influence over the perfected visual act. The evolution of binocular or stereoscopic vision has also received great attention, and there is now promise that by study of the highest mammalia we may arrive at more definite ideas concerning the unfolding of this most complex function. Psychology and ophthalmology have drawn much closer together, particularly in the study of muscular problems. Donders' theory for strabismus is no longer supreme. Worth's amplification of Javal's and Priestley Smith's ideas has met with many supporters, while the majority of discriminating ophthalmologists are adhering to a combination working theory to explain satisfactorily all their cases of strabismus.

Among conjunctival diseases that have been generally accepted during this period, we may mention vernal conjunctivitis, Parinaud's conjunctivitis, conjunctivitis nodosa, and conjunctivitis petrificans. It would be improper to omit mention at this time of the change in our ideas concerning the ætiology of most of the forms of conjunctivitis. The microscope is now frequently invoked to decide between the daily forms of conjunctivitis, and the day is not far distant when conjunctivitis will be classified not clinically but ætiologically and one will hear more on every side of Koch-Weeks, influenzal, diplobacillary, pneumococcus, diphtheritic, and Neisser's conjunctivitis, than of acute, sub-acute, chronic, catarrhal, purulent, croupous, or membranous conjunctivitis.

The same is true of corneal diseases. It is only a question of time until the classification of its diseases is put on an ætiologic rather than a clinical basis. The interdependence of much obscure superficial corneal disease and nasal lesions is also largely a development of the past two decades. Keratitis superficialis punctata, keratitis disciformis, and keratitis marginalis profunda are now accepted clinical pictures.

The only new feature concerning the iris is the disposition to return to the *dictum* of Fuchs that there is practically no simple iritis but always a more or less complete uveitis. This conception satisfies all ideas and theories concerning disease of the uveal coat, and it is to be hoped that writers, teachers, and clinicians will observe this change in nomenclature. One hesitates to open the question of sympathetic uveitis or ophthalmia but no one need hesitate to endorse the claims of Gifford for the value of the fullest possible dosage of sodium salicylate in all such conditions. It is the one ray of hope held out to us in the twenty years agone of the management of these appalling cases; that is to say, after they have developed. But in their prevention, the last decade has witnessed an out-and-out triumph in the exact localization of all penetrating foreign bodies by means of the X-ray. The names of Sweet in this country and Mackenzie Davidson in England will be forever associated with this method that has not only already saved hundreds of injured eyeballs, but done away with the necessity of their removal or the subsequent ruining of the fellow eye by the sympathetic process.

In spite of all the work of the experimentalists and the biochemists, we regret to be obliged to state that the question of the medicinal treatment of incipient cataract is as unsatisfactory as it was twenty years ago. We can speak more hopefully, however, concerning the operative management of incipient cataract. No discriminating ophthalmic surgeon would to-day hesitate to extract an incipient cataract from persons over 60 years of age if their vocation made it necessary and their health permitted. It is altogether likely that this will also prove the field of greatest usefulness of the now

well-known Smith operation of removal of the lens within its capsule. This seems to be the prevailing opinion among such American ophthalmic surgeons as have tried the method.

When we come to consider the orbit there is much to congratulate ourselves about, for our own knowledge touching the inflammatory conditions of the orbit has grown with great rapidity in the past two decades The works of Onodi, Fryer, Logan Turner, St. Clair Thomson, Holmes, Howell Evans, Loeb, Posey, de Schweinitz, and others reveal how we formerly went wrong in ascribing most orbital inflammations to endogenous causes when, in fact, they were due to some manner of nasal or accessory sinus disease.

Concerning choroiditis, there is little that is new, other than that it is to-day often accepted as a posterior uveitis indicating almost invariably disease further forward. Continued low grade choroiditis or choroidal congestion, as the condition antecedent to the formation of incipient cataract, is to-day one of the best accepted of clinical facts. It is also worthy of note that each year sees more cases of tuberculous choroiditis brought to report, thanks to the pioneer labours of Sydney Stephenson and George Carpenter.

As to retinitis, there is not much to chronicle unless it be the seeming increasing frequency of retinitis circinata and the postulate of W. T. Shoemaker that retinitis pigmentosa is a congenital disease, an hypothesis that has much to commend it.

The optic nerve, however, has been a field of much progress during this period. Retrobulbar neuritis has become a well recognized clinical entity, unilateral optic neuritis is known in many instances to be a focal manifestation, and the relation of optic neuritis to brain tumour brings out one of the most important relations of the ophthalmic to the general surgeon. Moreover, the decompression operation for the restoration of sight or its preservation is distinctly an achievement of the past decade.

Glaucoma has been a continuous battleground all through this period. On two things there seems agreement—first, as to the part played by both auto-intoxication and the arterio-sclerotic process in the production of both non-inflammatory and inflammatory glaucoma; second, as to the wisdom of operation in inflammatory glaucoma. But when the decision is made as to what operation shall be performed, one is bewildered by the array of operative procedures offered. All manner of filtration operations are now in vogue, and one may choose Herbert's or Lagrange's filtration method, Heine's cyclodialysis, or the trephine operation. Thomson Henderson has driven home one valuable point—namely, that unless an iris is badly altered anatomically, the cut edges after iridectomy do not heal and filtration thus goes on continuously. It is chiefly about non-inflammatory glaucoma that the greatest diversity of opinion has sprung up. Formerly, all these cases were operated on indiscriminately, but within the past decade a strong sentiment has sprung up against operation, the feeling being that myotics, properly used, and continued good elimination, afford the patient the best chance. Operation may be reserved for the final *coup*.

Laboratory diagnosis has become each year more and more essential to good ophthalmic work. Many cases of conjunctivitis and keratitis are to-day not possible of exact classification without the microscope. Resort is had to some one of the tuberculous tests almost daily in all obscure ocular inflammations. Search for the malarial parasite oft-times reveals a hidden cause, and the reactions of Wasserman and Noguchi promise to clear up many doubtful cases beyond all shadow of a doubt. Indeed, this is probably the greatest aid ophthalmic science has received in the past two decades.

The relation between diseases of the eye and those of the nose have at last been clearly defined, also between ocular and dental diseases. As to the intimate relation between diseases of the eye and those of the nervous system, a most voluminous literature has accumulated within five years. Three extensive treatises on this relation have been issued, one in Germany (four volumes), one in France, and one in this country. The part played by the eye in the arterio-sclerotic process is now more keenly appreciated than ever Indeed, the time has come, fortunately, when the ophthalmic surgeon must be a thoroughly trained general medical man, with special skill in the treatment of diseases of the eye.

In his sociologic relations, too, the ophthalmologist is taking his proper place. For twenty years and more, the most painstaking examinations of school children's eyes have been going on all over the United States, and the indications are that by the time of the next census enough *data* will be at hand on which to base fairly firm conclusions. In the public services the activity has not been so great, although in recent years the army, navy, and marine corps are awakening to the necessity of the best possible vision in these callings. In the mercantile marine, much crudity has existed in the tests made, but thanks to the recent activity of Posey and others, there seems now an indication that this, too, will be remedied. Eventually this same surveillance must needs be extended to all public service corporations in the municipalities throughout the country.

In another direction there is the hope held out to us by the action of the late International Ophthalmological Congress at Naples and the British Optical Society, that we may eventually arrive at some manner of standardization all along the scientific line, including visual standards, notations of lenses and prisms and their axes and their sizes, coloured glasses according to their absorptive powers, coloured tests, etc. In this matter, the British Optical Society is entitled to the thanks of the ophthalmic surgeon the world over for the public spirit shown and the high standard set in their work.

As to therapeutics, the advance has been remarkable. Dionin is a faithful servant, the organic silvers, chief among which is argyrol (notwithstanding the protests of the bacteriologists and laboratory experts) are firm friends, and chemistry has outdone itself to replace cocaine; and while that has not been accomplished, we should never cease to be grateful for acoin, novocain, alypin, and stovain.

Organotherapy has contributed its share to our glory, as witnessed by the value of thyroid extract in certain forms of interstitial keratitis and strumous ocular conditions in young girls.

Radiotherapy naturally has been brought to our aid, and the value of low vacuum X-ray tubes and of radium itself in the alleviation and cure of all manner of external diseases of the eye needs but to be mentioned to be accepted.

No review of the subject of therapeutics would be complete that did not include that greatest of all advances, serotherapy. Whether this shall be a specific as claimed by Romer and Axenfeld, or paraspecific as advocated first by Darier, and later by Deutschmann, each worker must decide for himself. Our own feeling is that until we are in possession of more clearly defined facts, the chances for the patient's recovery from his ophthalmic disease are greater under paraspecific than under specific therapy. Let us first cure the patient, and then as quickly as may be, learn how it is brought about.

Lastly as to therapeutics, we cannot forbear mention of Ehrlich's latest preparation "606," concerning which the most startling claims are now being

made as to results in the treatment of syphilis. If these claims are substantiated, the duration of the treatment of many specific eye diseases will surely be much shortened.

Tonometry is a relatively new field, but the tonometer as an instrument has come to stay. Schiötz' instrument, or better yet, Gradle's modification of it, must become a daily instrument in the hands of the ophthalmic surgeon, and the wealth of knowledge to be gained by its use is beyond present computation.

In one thing American ophthalmology has taken the lead in the past twenty years, and that is in the practical application of the science of refraction, of the truth as it is in Donders. This is the peculiar glory of the American ophthalmic profession. They have proven the wisdom of search for every bit of astigmatism in myopia and of its full correction as a means of preventing its further advance. They have further proven the need of search for hypermetropia and its allied astigmatism in every one who has need to use their eyes to any extent. There are those who claim that in this particular matter we are tipping the balance to the other side, but better the excess of zeal in this direction than the defect of carelessness. On this one accomplishment alone, the ophthalmic profession in America might well rest, but much more is their due measure of credit. In searching out this phase of the matter, it was decided to find out approximately what part this Academy has taken in assisting in the advance of ophthalmology during the past two decades. It is interesting to learn that of the 600 and more members of the Academy, 35 are the authors of various text-books on the eye, ear, nose, and throat; 30 more have taken part in the preparation of various systems on these kindred diseases; 60 are engaged in the teaching of ophthalmic or rhinologic science; and 225 contribute from time to time to magazines devoted to these allied specialties. This is a record of which we may well be proud.

The question now arises as to what shall be the future of the Academy? This depends on several factors:—

(1) It must continue to maintain a membership that shall be representative of the best the profession affords.

(2) This membership must be drawn from the teachers, writers and, clinical observers, on the one hand, and from that large class of earnest workers in the lesser cities and towns who do not enjoy such affiliations, on the other hand. If this latter class will come to the meetings and discuss moot questions from the standpoint of their individual experience, the Academy will profit much by their co-operation.

(3) The membership must be representative of every portion of the United States, and not of any section thereof.

(4) The Academy must eventually so amend its constitution as to admit not only to membership, but to office-holding, any Canadian who may be a member of the British Medical Association, and any Latin American (Central and South American) who can be shown to be in good standing in his respective country.

(5) The Academy must at all times stand ready to foster and forward any and all projects and movements looking to the advancement of the ophthalmologists and oto-laryngologists the country over.

(6) The Academy should live up more fully to the provisions of Article II of its constitution and bye-laws, which provides that, "The object of the Academy shall be to encourage the study and practice of medicine and surgery in their relations to the eye, ear, nose and throat." To this end, it is urged upon the membership that some manner of fund be established from

which annually or biennially or triennially either an award be made to any member of the Academy who may have made some signal contribution to ophthalmology or oto-laryngology, or that a travelling scholarship of $300 to $500 be instituted to be awarded to any member of the Academy who may make a contribution to our allied sciences of sufficient merit to justify such award. This will fulfil the object of Article II, which plainly defines the function of the Academy—namely, to encourage its younger members to original research with the idea of rewarding such research in some suitable manner. This is the true function of such an Academy, and this must be the response to the dear old medical friend of twenty years ago.

We have seen ophthalmic science advance every year of the way, not by leaps and starts, but by that gradual accretion of knowledge that is the basis of all final truth. It is still a young science full of hope, faith, and power, and rich with opportunities, possibilities, and privileges.

In conclusion, let us be thorough in all we do. Let us be strong, and the exercise of our strength to-day will better equip us for the morrow. To-day is our day, your day and mine, the one day we have, the day in which to play our part. What our part may signify in the great whole we may not understand, but we are here to play it, and now is the time.

TREPHINING FOR GLAUCOMA.

BY

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IN THE OPHTHALMOSCOPE of July, 1910, I published the results I had obtained in trephining for glaucoma, and tabulated the histories of 22 eyes in 15 persons who had returned to the General Ophthalmic Hospital, Madras, at periods varying from one to nine months after operation.

Since the appearance of that paper, as well as before it, surgeons (both in private correspondence and in the medical press) have raised two questions of out-standing importance, *viz.* :—(1) Will these satisfactory results of lowered tension bear the test of time? and (2) Is the operation suitable for the treatment of acute cases of glaucoma?

The following cases will, I venture to think, materially aid in the solution of these two problems.

Abstracts of cases in which trephining was performed for acute glaucoma.

1. T. Ammayammah F, æt. 40, Hindu, admitted to the G. O. Hospital, Madras, 15th July, 1910, operated 16th July, 1910, discharged 15th August, 1910. History of slowly progressive cataract for five years; ten days ago severe headache on R. side, pain, lacrymation, and marked congestion in R.E. Onset very sudden; V. = hand movements. R.E. acutely congested, and presenting typical picture of acute glaucoma secondary to intumescent cataract; the cataract presents the appearance of an over-ripe primary cataract. On admission, eserine was instilled and leeches were applied; a free purge was given and morphia administered. On 16th July, 1910, the sclera was trephined above the cornea with a 2 mm Bowman trephine, after subconjunctival administration of cocaine and adrenalin, combined with a hypodermic of morphia; the iris bulged into the wound and was snipped, when it at once returned; aqueous escaped freely and the chamber emptied. Pain ceased soon after operation and did not return. Maklakoff's tonometer showed a 4 mm. reading before operation (high tension), an 8·5 mm. tension

four days after operation, and a 6 mm. tension (on the low side) on discharge. She went out with the eye white and quiet, and with instructions to return for extraction of the lens later: filtration was free and vision was as on admission.

2.—Parthasarathy Pillay, male Hindu, æt. 56, admitted on 26th July, 1910, suffering from acute glaucoma of R.E. Fifteen days ago he walked 12 miles to take a bath. That night headache and pain in eye commenced, and has continued with occasional exacerbations since. Both eyes are in a state of acute glaucoma with steamy cornea, shallow chambers, and evidence of acute congestion. The tension is + 2 (3 mm. by the tonometer) in each eye—R.V. = O, L.V. = H.M. Under active treatment (eserine, leeches, etc.) the condition of each eye improved, and the tension fell to 4 mm., but quickly rose again. On July 28th, 1910, both eyes were trephined, after sub-conjunctivally injecting cocaine and adrenalin (trephine diam. 1.5 mm.) Iris prolapsed into the wound of the R.E. but returned on snipping it with scissors. In the L.E. the iris gave no trouble, and was not interfered with; in both eyes aqueous escaped freely and the chambers emptied. Tension on the seventh day was below normal (tonometer reading 7 mm.) in each eye. On discharge on tenth day the eyes were quiet. R.V. = counted fingers at 7 metres; L.V. = fingers at 7 metres. All symptoms relieved.

Remarks. These two cases have been selected out of a number of similar ones from my notes to show that one can safely trephine eyes in a state of acute glaucoma, and that by so doing one can obtain speedy relief for the patient, and this under a local anæsthetic only.

Abstracts of cases in which free filtration was still being maintained when they were seen a full year after operation.

These are the only two cases which have hitherto returned for inspection a *full* year after trephining.

1.—D. Venkataramana Row, scheduled as case 4 in my paper published in THE OPHTHALMOSCOPE, p. 490, July, 1910, returned to Hospital on 16th August, 1910; was kept there till 23rd August, 1910, to complete the year since operation. R.E., there is a freely filtering fistula as indicated by a black hole in the sclera, surrounded by a wide patch of sub-conjunctival œdema; T. low (6·75 with tonometer); V. remains 6/18; the small v-shaped iridectomy can be seen peripherally under cover of the sclera by the aid of a loupe. L.E. condition the same as above, except that the T. is lower (5mm. by tonometer). The visual fields seem to be practically as before, and are much contracted, especially in the R.E.

The question that arises is whether one has overdone the filtration in this case, and lowered tension dangerously; the case will be followed very closely and again reported if possible.

2.—B. Alagasingariah, male Hindu, age 37, was operated on for congestive glaucoma, on 2nd September, 1909, and returned to the G. O. Hospital again for the first time on 10th September, 1910. The tension before operation was + 2 (tonometer reading 4mm.), V. = hand movements; the operation went smoothly, and the iris was not interfered with; on 13th October, 1909, he was discharged from hospital. There was well-marked œdema of the conjunctiva over the trephine hole, chamber full, pupil central, T. normal (tonometer reading 5·25 mm.), V. = H.M.; on 10th September, 1910, the note is—Conjunctival œdema over trephine area well marked; filtration free, pupil central but inactive, chamber shallow, T. normal (tonometer reading 6 mm.) V. = H.M. The œdema increases and the tension falls if the eyeball is gently but firmly massaged.

Remarks.—I feel confident that any unprejudiced observer who examines the above two cases will have no difficulty in satisfying himself that in both of them a permanent drain has been established from the anterior chamber into the subconjunctival space.

General remarks.—1. Further experience has endorsed the opinion offered in my former papers, namely, that vitreous escape during the operation can be reduced to a very low figure (if not altogether prevented) by keeping close to the limbus and by using a small trephine. A review of the cases now returning to Hospital, which were operated on by Bowman trephines of 2mm. and 2.5 mm. diameter, point to the conclusion that our aperture is too big in these cases: the filtration tends to be too free and the tension is lowered more markedly than one cares to see it. We are now using a trephine of 1.5 mm., and are getting very satisfactory results therewith. The criticism offered that the edges of the trephine hole would be ragged, and that the consequent tendency would be towards tissue proliferation, and consequent blocking of the hole, did not at any time appeal to me. If the wound be aseptic, I submit that tissue proliferation need not be feared. However, I asked Captain Ingram,

Professor of Pathology, Medical College, Madras, if he would be so kind as to cut some of the discs removed, and report on the state of their edges : he reported that they were cleanly cut.

Whether the question is looked at from a pathological, a microscopical, or a clinical point of view, I submit that the evidence is against the danger of the filling-up of the hole being a real one, *provided the wound is aseptic.*

2.—The great importance of entering the chamber directly should be kept steadily in mind. If the conjunctival flap is pulled well on to the cornea, and the dissection is proceeded with till the rounded edge of the limbus can be seen overhanging the scleral tissue, it is safe to tap the chamber at once. The comparison which at once suggests itself (and my excuse for using such an inelegant simile is the extreme importance of being able to recognise the sign) is to the manner in which the glans overhangs the neighbouring portion of the penis. If this appearance of the limbus is seen, tapping the chamber is a certainty. In old long-standing sub-acute cases, it is difficult to obtain the above result ; these are precisely the cases in which the surgeon may fail to enter the chamber, and thus be confronted with a complicated operation and probable failure in the ultimate result. In such, I have taken to dissecting well into the cornea with the points of a pair of sharp-pointed scissors. I dissect boldly inwards, splitting the corneal layers till I feel I am well over the corneal margin and safe to enter the chamber. The results have been excellent.

3.—The quiet iritis alluded to in my last paper as complicating some of the cases, is a complication against which it behoves us to be ever on our guard. It is difficult to explain the phenomenon, but there can be no doubt that it occurs not infrequently ; so much so that our present rule is to instil atropine in all cases on the third day, unless the iris is showing a tendency to be displaced upwards or to block the trephine hole.

Postscript.

4.—G. T. Ramanatha Mudaliar, male Hindu, æt. 61 years, scheduled as case No. 5 in my paper published in THE OPHTHALMOSCOPE of July, 1910, p. 490, was operated on for glaucoma in both eyes, August 24th, 1909, with a 2·5 mm. trephine ; he has to-day (September 15th, 1910) returned for examination. R. E.—T. sub-normal (tonometer reading, 7·5 mm.), conjunctival œdema over trephine hole well marked, filtration free, depth of chamber normal, pupil central, and V. hand movements. L. E.—T. sub-normal, conjunctival œdema well marked, filtration free, depth of chamber normal, pupil central and active, V. = 5/50 — 4·0 sph. = 5/20.

The tension in both eyes is therefore practically the same as it was when seen seven months after operation ; R.V. is unaltered, whilst the L.V. has gone up from fingers at 3·5 metres to vision of 6/20 with suitable correction. This is one of our earliest cases and nearly thirteen months have passed since operation. Before operation R.V. = hand movements and L.V. = fingers at 2 metres.

ON SLOUGHING CORNEÆ IN INFANTS: AN ACCOUNT BASED UPON THE RECORDS OF THIRTY-ONE CASES.*

BY

SYDNEY STEPHENSON, D.O. (Oxon.).

LONDON, ENGLAND.

THAT the cornea may become gangrenous in babies suffering from inanition is a fact that must have struck attentive observers since the earliest dawn of scientific medicine.

The condition is tolerably common in several parts of the world. Thus, in Berlin, A. von Graefe[1] spoke of seeing the disease almost every session and sometimes of meeting with three or four such cases in the course of a single month. Hirschberg,[2] again, declared that of the 7,000 new cases received at the Berlin *Klinik* every year, eight or nine were instances of keratomalacia. It is frequent, according to Thalberg,[3] in Russia, especially towards the termination of the great Lenten fast (end of March and beginning of April) and after the fortnight's fast in August. Nine of the thirteen cases reported by Thalberg were in children under 3 years of age, and of them 77.77 per cent. were in sucklings. It prevails also among the half-starved negro children in South America, where it goes under the name "Ophthalmia Braziliana," bestowed upon it by Gama Lobo.[4] That author reported four fatal cases in children, in whom there likewise existed pronounced pulmonary and gastro-hepatic disturbances. Gama Lobo laid particular stress upon the lethargy exhibited by the patients, who would remain for hours together in any given position. Ullersperger[5], who wrote in the same year as Gama Lobo, described four fatal cases in children of from eighteen months to five or six years of age. de Gouvêa[6], writing seventeen years later, confirmed and extended Gama Lobo's observations in Rio de Janeiro. He pointed out that night-blindness invariably preceded the other ocular symptoms, and he added some new signs of the Brazilian ophthalmia—as, for example, alopecia, pica, ulcerations over bony prominences, and yellowish *plaques* upon the skin, particularly of the face. The cause of the disease, in his opinion, was the almost exclusively farinaceous nature of the food given to the slaves on most of the Brazilian haciendas. "This, combined with severe work and lack of sleep," he remarked, "makes of the slaves veritable gold-producing machines."

Colonel H. Herbert[7] found epithelial xerosis to be so common among the poorer classes in Bombay, India, that he was able to collect one hundred consecutive cases in four months, June to September, 1896. In infants, as he pointed out, the cornea was liable to rapid suppurative destruction. According to M. Mori,[8] in Japan this peculiar disease of children is well-known It appears epidemically in that country during the months July to September, when diarrhœa is rife, and is known in the vernacular as "Hikan." The chief symptoms are diarrhœa, voracity, distension of the abdomen, wasting, dryness of the skin, night-blindness and xerosis of the conjunctiva. In severe instances the hair loses its sheen and becomes dry; the cornea gets opaque and there is hypopyon and prolapse of the iris; and the case ends in complete disorganisation of the eyeball. Colonel

* Anniversary lecture of the American Academy of Ophthalmology and Oto-Laryngology delivered at Cincinnati, Ohio, U.S.A., on September 19th, 1910.

M. T. Yarr[9] tells us that keratomalacia is not uncommon in the tropics, especially in the native quarter of great towns, such as Calcutta, Bombay, and Hong Kong. The patients, who are mainly children, emaciate rapidly, suffer from diarrhœa, and frequently die.

A similar condition is found, although it is not common, in England, where it affects babies whose nutrition is at a dangerously low ebb. The disease was described in 1827 by Joseph Brown,[10] of Sunderland, in a brief communication which bore the significant title of "*A case of ulcerated Cornea, from Inanition.*" He met with a case in a baby of six months, who had never had the breast-milk, and who was so much emaciated that the movements of the intestines were visible through the parieties of the abdomen. *Mackenzie[11] refers to the condition as one that he had repeatedly seen in infants emaciated from various causes, as chronic diarrhœa, cough following measles, hydrocephalus, and syphilis. Sir William Bowman[12] met with a case in a marasmic infant of thirteen months in whom both corneæ sloughed, and the child died five days after she was first seen. W. T. Holmes Spicer[13] published an account of three cases in the year 1893. A year later, Tatham Thompson[14] narrated a fatal case in a baby of two months affected with acute jaundice, not of congenital origin. Two instances of keratomalacia, both apparently due to disseminated tuberculosis, were published by myself[15]—one in 1902 and the other in 1905. Arthur W. Ormond[16] reported a bilateral case in a wasted infant of ten months, affected also with xerotic patches on the conjunctiva. The patient was the youngest of fourteen children. Neither syphilis nor tubercle appeared to be present in Ormond's patient. Lastly, in 1907, I[17] published an account of four cases of infantile gangrene of the cornea, in scrapings from which the treponema pallidum was found.

As may be gathered from the scanty references given above, keratomalacia is far from common in England. But that is an entirely different thing from asserting its absence, as a recent writer, N. Bishop Harman,[18] has done. In the work referred to Harman makes the singular statement that severe forms of xerosis conjunctivæ associated with keratomalacia apparently do not occur in England, except following the ophthalmia of newly-born children. As a matter of fact, under the conditions named by Harman the disease is rare.

To judge from the paucity of published cases (not always a safe thing to do), keratomalacia must be uncommon in the United States. So far as I know, the disease has been described from first-hand knowledge only by William S. Little[19] (1882), J. E. Weeks[20] [and] [21] (1887 and 1901), Thomas C. Evans[22] (1898), J. M. Ray[23] (1898), and Charles W. Kollock[24, 25, and] [26] (1890, 1892, and 1894).

Isolated examples were described by the first four writers, but Kollock's several communications were of more interest, since they showed that keratomalacia, associated with xerosis and pigmentation of the conjunctiva, was common among the young negro children of Charleston, the largest city of South Carolina, where more than one-half of the inhabitants are coloured. The disease was never seen among the whites. Kollock surmised that the food of the negroes, whose *menu*, according to the description he gave, consisted of "hominy (grits), rice, fish, and bad hog meat," had something to do with the condition. On the other hand, the whites were immune, he

*The communications of Brown and Mackenzie effectually disprove the claim made by Adolf Knaebel (*Ueber Keratomalacia infantum*, Tübingen, 1901), namely, that the first cases of keratomalacia were published in the year 1846 by J. N. Fischer (*Lehrbuch der gesammten Entzündungen und organischen Krankheiten des menschlichen Auges*, 1846, S. 275). For that matter, Rau (v. Ammon's *Monatsschrift*, 1841), published two cases in children, aged 5 and 10 years respectively, five years before Fischer wrote.

thought, because they did not eat so much fish, and "the quality of hog meat was better than that used by the negro, who will frequently buy strong smelling meat in preference to that which has no odour." In Kollock's experience, when the cornea broke down and suppurated, treatment availed little, and the patient soon died.

From what has been said it may be concluded, then, that a destructive form of keratitis, often associated with xerosis of the conjunctiva, may be met with in young children of low vitality, not only in Germany, Russia, Brazil, the East Indies, China, and Japan, but also in England and in some parts of America.

With two exceptions, the cases which form the basis of the present communication, thirty-one in number, were encountered at two London hospitals for children, *viz.*, the Evelina and the Queen's. The former furnished six cases and the latter twenty-three cases of keratomalacia. The relative size of the hospitals has doubtless something to do with the different number of cases seen at the two places. There is, however, another factor.—The difference in the figures is correlated with a difference in the class of child attending the two institutions. Thus, the Evelina draws its clients mainly from the rural, semi-rural, and surburban districts south of the river Thames, whereas the Queen's derives 85 per cent. of its patients from densely-populated and poverty-stricken districts in the east-end of London, where indigence, dirt, ignorance, vice, and alien immigration jostle one another at every corner.

As babies suffering from keratomalacia are always ill (often dangerously so), it can be readily understood that they are usually kept at home, or if taken to a hospital, an ophthalmic hospital is not the most likely place where advice would be sought. Hence, it is at a large children's hospital in the poorest part of a great city like London that such cases are likely to be met with, if anywhere.

Among 7,000 patients Hirschberg saw 8 or 9 cases of the disease (1 in 875 or 1 in 777); among 28,000 patients Leber met with 4 cases of the disease (1 in 7000); among 30,000 patients Braunschweig[27] saw 16 cases (1 in 1875); among 34,000 patients Kuthe[28] met with 26 (1 in 1307); and, finally, among 16,600 patients Peltesohn[29] found 3 cases (1 in 5533).

From the figures at my disposal, I estimate that keratomalacia is encountered in one per thousand of the eye cases attending a children's hospital in the poorer part of London.

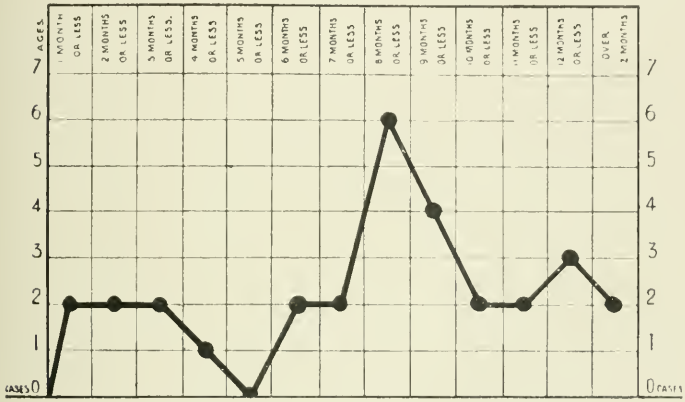
Keratomalacia, in my experience, is a disease of children whose ages range from one month to twenty months. It is as rare above as it is below those limits. The oldest patient seen by A. von Arlt,[29] who described the disease as long ago as 1850, was fourteen months of age. It is of some importance to note that during the first few weeks of life—that is to say, when ophthalmia neonatorum is rife—keratomalacia is uncommon. At the same time case No. 11 in my present series occurred in a premature baby admitted on the seventh day of extra-uterine life. The baby, although kept in an incubator, succumbed, after an illness lasting twenty-seven days, from a cause that was never satisfactorily explained, despite a *post-mortem* examination. The baby may possibly have died from a general streptococcal infection, such as is believed by Kassowitz and Hochsinger[30a] to occur in syphilitic infants. The ages of my other patients have ranged from one month to twenty months, seventeen of the total number (*i.e.*, about one-half) having occurred between the eighth and twelfth months of life. The average was 4·54 months. In face of these facts it becomes a little difficult to understand on what grounds Valude[31] makes the statement that the affection ordinarily begins in the first few weeks of life and is not met with after ten months. It may be noted in passing that in Knaebel's[32] series of eighteen

cases of keratomalacia the youngest patient was aged three weeks and the oldest six months, The average was 11·16 weeks.

Personally, I have never seen an instance of keratomalacia except in the children of the poor.

As regards sex, Knaebel's figures[32] seemed to show that keratomalacia was much commoner in males than in females. Of his eighteen cases, 83 per cent. (15) were in males and 17 per cent. (3) in females. Thalberg's figures, again, give males 6 (66 per cent.) and females 3 (33 per cent.). On the other hand, Braunschweig's figures[27] dealing with 16 cases, gave males 5 (31·65 per cent.) and females 11 (68·75 per cent.) My own cases indicate no such disproportion between the sexes, which is probably merely fortuitous. Of my thirty-one cases, 13 (41 per cent.) were in males, 17 (54 per cent.) in females, and in one (3 per cent.) the sex was not noted.

von Graefe, as well known, attributed keratomalacia in infants to encephalitis, and Hirschberg adopted a similar view. The changes supposed to be characteristic of encephalitis were found by Professor Klebs in two of von Graefe's patients, aged three and four months respectively. The three



The age distribution in London of Thirty Cases of Keratomalacia.

cases described by Hirschberg showed, after death, similar changes. Bezold[33] found a degeneration of the glial cells of the brain in an infant, aged one month, who developed keratomalacia after measles. In reporting a fatal case in a female infant of ten weeks suffering from "spasms" and diarrhœa, William S. Little[19] spoke of keratomalacia as "symptomatic of a brain lesion, with a neuro-paralytic condition of the fifth nerve distributed to the cornea." He describes the condition as preceded by convulsions or loss of consciousness, and speaks of all cases being associated with a brain lesion of severe character, central in position and rapid in progress. In 1883, Jacqusiel[34] presented sections from the brain of such a case with the idea of supporting v. Graefe's theory of causation; but more than one member of the Berlin Medical Society, after examining the specimens, expressed his doubts as to their pathological nature.

It may be asked why v. Graefe's view, apparently so well grounded on the work of competent pathologists, has found but little support of late years.

The reason is simple, namely, that the diffuse infantile encephalitis of Virchow is nowadays regarded as non-existent. Certainly, with rare exceptions, as in Weeks' case and in one of my own, the clinical symptoms do not point in the direction of a cerebral affection, a fact insisted upon by v. Graefe and by Hirschberg themselves. The only kinds of infantile encephalitis recognised at the present time are such as may occur locally in association with meningitis or with syphilitic arteritis or with thrombosis secondary to an infective disease, such as measles.

Jastrowitz[35] examined the brains of 65 infants who had died from various causes, and found the changes supposed to point to encephalitis present in all save one. Indeed, the existence of an encephalitis recognisable only with the microscope, such as that thought to exist in v. Graefe's and the other cases, must in the light of modern pathological knowledge be regarded as something more than merely doubtful. In brief, we are compelled from the evidence before us to conclude with Max Knies[36] that the granulo-fatty corpuscles, once looked upon as characteristic pathologically of encephalitis, are now known to occur in the brain of all little children.

Writing in the year 1877 Förster[37] laid considerable stress upon diarrhœa as a cause of keratomalacia in infants during the first six months of life.

W. T. Holmes Spicer,[13] who reported three cases of keratomalacia in the year 1893, concluded that the malady affected "starving or hand-reared infants brought up on starch foods without milk, and with absence of nitrogenous elements and fat." This statement seems to me to amount to little more than a very fair description of the food usually given by ignorant mothers to very poor babies in London. Whether it is enough to account for sloughing of the cornea, I will not undertake to say. But of one thing I feel tolerably certain, namely, that if it be, then keratomalacia should be much commoner in London than appears to be the case.

J. Tatham Thompson[14] considered acute jaundice to be one of the causes of keratomalacia.

In 1883, Leber[38] described a case that seemed likely to throw a new light upon the ætiology of keratomalacia.—A baby, aged four months, suffering from that ailment, died from broncho-pneumonia. After death, cocci and bacilli, similar to those found in the eye during life, were discovered in the calices of the kidneys, along with a desquamating epithelial affection analogous to xerosis of the conjunctiva. In this connection, however, the fact may be mentioned that in ordinary idiopathic marasmus the kidneys, according to Koplik,[39] may be the seat of parenchymatous degeneration.

In the following year (1884) Schulz[40] published a case confirmatory of Leber's observations. Schulz found cocci and bacilli, the exact nature of which he did not determine, in the conjunctiva, lungs, and kidneys of a baby of five months, who died from keratomalacia and broncho-pneumonia, after an illness which lasted for about twenty days. The value of the observation, however, is somewhat lessened by the fact that the autopsy was not made until fifty-two hours after death.

In 1888, Leber and Wagenmann[41] described a case which suggested that keratomalacia may be the outward and visible sign of a generalised bacterial invasion.—A male baby, aged ten days, manifested necrosis of the ocular conjunctiva around the cornea of the right eye, which itself remained almost free from opacity. The left eye showed no changes. Syphilis was not present. The child died a few hours after he was first seen. The autopsy, undertaken by Professor Orth, eleven hours after death, failed to reveal any cause adequate for death, and, in particular, there was no evidence of encephalitis. Bacteriological investigation, however, brought to light the fact that a

multiple streptococcal invasion existed. Streptococcal chains were found in the vessels of the tissues of the eye, as well as in the other organs examined, *viz.*, the kidneys, the suprarenal bodies, and the skin. By Leber and Wagenmann this bacterial invasion was believed to be responsible both for the ocular affection and for the lethal issue of the case. It is, nevertheless, to be noted that the baby had an affection of one external ear, presenting a close resemblance to gangrenous dermatitis, a disease known to occur in marasmus, and to be usually associated with the streptococcus pyogenes (L. E. Holt). Is it not possible that the generalised streptococcal invasion was connected more closely with the ear than with the eye trouble?

Bahr and Garnier[42] made an autopsy upon a case of ulceration of the cornea in an infant of fourteen months, and found the immediate cause of death to be purulent meningitis and bronchitis. Masses of streptococci were present in the vascular tissues of the eyeball, and the same micro-organism was cultivated from the sanious pus of the subdural space. The authors explained their case by supposing that the streptococci, after perforating the cornea, had gained access to the circulation, had by that means infected various parts of the body, and by their localisation in the brain had caused the death of the patient.

An important case by J. E. Weeks,[71] of New York, bears upon the possibility of endogenous infection as the cause of keratomalacia. — An emaciated and bottle-fed baby, *ætat* eight months, suffered from xerosis of the conjunctiva, together with ulceration of the corneæ. Death from exhaustion after a stay of eleven days in the New York Eye and Ear Infirmary. The autopsy showed a fatty liver and enlarged spleen and kidneys. The pelvis of the right kidney was filled with flocculent pus, while its lining mucous membrane was coated with a frothy, whitish exudate, resembling to some degree the secretion on the conjunctiva observed during life. Bacteriological examination showed that the xerosis bacillus was present in conjunctiva, pelvis of the kidney, liver, spleen, and pancreas.

Although it appears to be supported by some of the cases mentioned above, yet the theory of endogenous infection may, in my opinion, be put on one side without hesitation. The experiences of Baumgarten and of Braunschweig[27] prove that, as a rule, micro-organisms can be grown neither from the blood during life, nor from the viscera after death, of children affected with keratomalacia. All available evidence, indeed, goes to show that the determining cause of the corneal ulceration is to be found in exogenous infection with this or that pyogenic micro-organism, while its predisposing cause is the lowered vitality of the patient. The predisposing cause would probably be inadequate without the exciting cause, and *vice versâ*.

Keratomalacia, then, in my view, is not to be regarded as the mere local manifestation of a generalized infection, as suggested by the cases of Leber, Schutz, Weeks, and some others.

It is significant that keratomalacia hardly ever occurs in breast-fed babies, unless, as in Russia, the mother's health has become impaired by long fasting, a thing scarcely likely to happen either in America or England. This point is well brought out by Knaebel's figures[32], according to which only three of eighteen children with keratomalacia had been nursed by their mothers, and the rest, fifteen in number, had been reared on various kinds of artificial food. My own figures tell the same tale and point the same moral.—Of my thirty-one cases, two, or 6·46 per cent., were entirely breast-fed; twelve, or 38·71 per cent., were fed exclusively upon artificial food; and seventeen, or 54·83 per cent., were reared partly upon breast milk and partly upon artificial food.

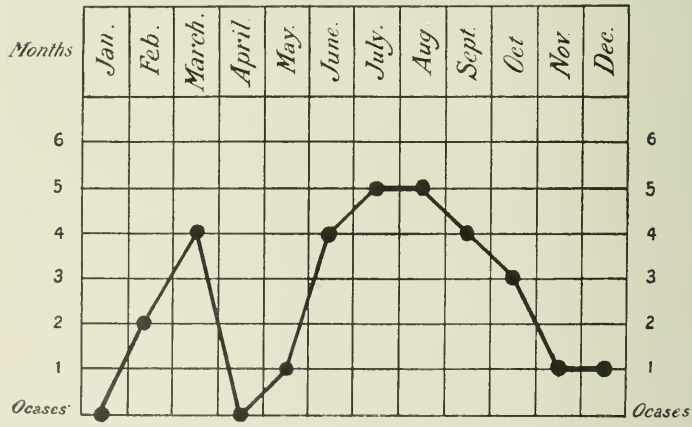
Two important points brought into relief by Knaebel[32] are that—(1) keratomalacia is disproportionately frequent in twin children, and (2) illegitimate are more apt to be affected than legitimate offspring.*

Without exception, the victims of keratomalacia are marasmic—"little wasters," in the pitifully expressive slang of a children's hospital.

The marasmus may be either symptomatic or idiopathic. The causes of the former include tuberculosis, syphilis, and imperfect dieting, with its sequels in the shape of chronic diarrhœa and vomiting, the familiar "D. and V." of a children's hospital. It is, however, to the idiopathic group that the name "marasmus" or "athrepsia" may more properly be applied. In such cases, as well known, neither examination during life nor dissection after death enables us to ascertain the cause of the malassimilation, which may possibly be due, as some have supposed, to microscopical changes in the glands and other appendages of the alimentary tract. It is, as L. E. Holt has well said, "a vice of nutrition only."

In London keratomalacia has a distinct seasonal incidence, due to the fact that "D. and V." ("xymotic diarrhœa" in more technical terms) is more or less epidemic in that city during the months of June, July, and the early part of August. Thus, of thirty cases of keratomalacia, about three-quarters (73·33 per cent.) appeared in the six warm months, May to October, and only about one quarter (26·66 per cent.) during the six colder months, November to April. No cases were met with in January and April For some unexplained reason, however, March proved an exception to the rule, since no fewer than four cases of keratomalacia came under notice during that month

The connection between keratomalacia, on the one hand, and the disease variously known as "epidemic enteritis," "zymotic enteritis," "ileo-colitis," or

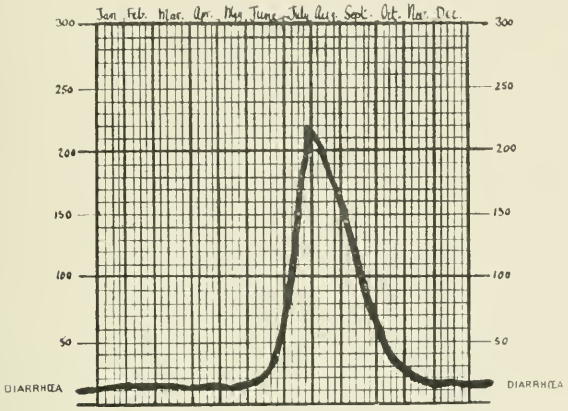


The Seasonal Distribution in London of Thirty Cases of Keratomalacia.

"epidemic diarrhœa," on the other, may be brought out in another way, namely, by contrasting graphically the seasonal curve of the two ailments.

*Of Knaebel's eighteen cases of keratomalacia five were in twins; fifteen were legitimate and three illegitimate children.

This has been done in the accompanying diagrams, an inspection of which shows that June, July, August, and September represent the greatest mortality from epidemic diarrhœa and the greatest incidence of keratomalacia. Diarrhœa, like keratomalacia, falls during September and October, and with the exception noted above, scarcely exists during the remaining months of the year.



The seasonal incidence of deaths from diarrhœa in London (50 years, 1841-1890).

From *The Elements of Vital Statistics*. By Arthur Newsholme. 1899.

If we distribute thirty of the cases of keratomalacia amongst the four quarters of the calendar year, we shall find that the malady was most prevalent in the

Quarter.	Zymotic diarrhœa[1] (15,478)	Keratomalacia (30).
First	8·7	20·00
Second	10·8	16·67
Third .	60·7	46.66
Fourth	13·8	16·67

third quarter, next prevalent in the first quarter, and was equally prevalent in the second and fourth quarters. If this be compared with the prevalence of zymotic diarrhœa distributed in the same way, the close correspondence in the highest seasonal variation of the two maladies will be at once apparent. It might be closer still were not the figures dealing with keratomalacia necessarily so restricted.

The syphilitic origin of keratomalacia has been insisted on by several writers, amongst whom may be mentioned Horner (1882), Biber (1890), Zirm (1895), Peltesohn (1898), Evans (1898), Krausse (1899), Valude (1905), and Terrien (1905). Horner[14] met with cases of keratomalacia which recovered, and which later developed true interstitial keratitis. He also saw in the same family an infant suffering from keratomalacia succumb to athrepsia, while a

brother presented the classical signs of Hutchinson's interstitial keratitis. Terrien[45 and 46], indeed, does not hesitate to claim that hereditary syphilis constitutes the chief factor in the production of keratomalacia, although he adduces no formal proof of this somewhat sweeping statement. Wicherkiewicz[47] goes even further, and, if I understand him aright, denies the ability of any factor, other than hereditary syphilis, to cause the disease.

The discovery by myself[17] of the spirochæta pallida in scrapings from the cornea constitutes the experimental proof (if such were needed) of the reality of syphilis as a factor in the causation in certain cases of keratomalacia.

A glance at the curve representing the age incidence of my thirty cases of keratomalacia shows a rise extending from the first to the third month, followed by a fall, after which the incidence of the disease becomes greater until it reaches its maximum in the eighth month. The initial rise appears to be accounted for by the fact that the manifestations of congenital syphilis, as shown in a well-known monograph by the late George Carpenter[48], of London, reach their highest point in the second month of life, and then slowly decline until after the ninth month, when they may be said to be practically non-existent. It is interesting to observe that even in a small series of cases such as mine, the influence of syphilis is able to imprint itself in so definite a manner upon the age incidence of keratomalacia.

Finally, it may be added, that of my 31 cases of keratomalacia, syphilis was diagnosed clinically in seven cases, or 22·58 per cent.

Tuberculosis existed in six (19·36 per cent.) of my thirty-one cases of keratomalacia, the diagnosis being made during life in three and after death in three of the children. It is to be noted that of the twelve fatal cases tubercle was present in 25 per cent. The disease was of the generalised type, as usual in children of so tender an age, with pulmonary or meningeal manifestations. The figures are small, but so far as they go, they indicate that tuberculosis is an important cause of keratomalacia in infants. I will not now stay to enquire whether the tuberculosis was primary, or merely grafted, so to speak, on a pre-existing malady, nutritional or otherwise. It is of more importance to remember that at such an early age there are many points of resemblance between marasmus, on the one hand, and tuberculosis, on the other. Progressive wasting, pallor, and loss of strength are features common to both affections. Many a case assumed to be one of marasmus has been found upon the dissecting-room table to be one of tuberculosis.

Much as in Russia, where, as already said, keratomalacia is commonest towards the end of the great religious fasts, so in London its greatest prevalence coincides with, or closely follows, the season when zymotic diarrhœa is most frequent. A similar sort of thing, according to Mori is observed in Japan also. Of my cases, 9 (or 29·03 per cent.) were due to zymotic diarrhœa.

As for marasmus, pure and simple, that accounted for 7 (or 22·58 per cent.) of my thirty-one cases.

Finally, in two of the cases (6·45 per cent.) the cause of the corneal mischief remained obscure.

A clue to the cause of the corneal gangrene is sometimes given by the age of the child. Thus, the most likely factors during the first two or three months of life are prematurity, twin births, congenital syphilis, and infantile atrophy. Later cases are more commonly the result of zymotic diarrhœa, tuberculosis, or of insufficient or unsuitable food.

But when all is said and done, we shall not err greatly if we assume that destruction of the cornea may supervene, other things being favourable, in any baby whose nutrition is seriously impaired, whether as the result of disease, semi-starvation, or, for that matter, from any cause whatsoever.

Some systematic writers have spoken of the disease as though a fatal termination was inevitable. Hirschberg[2] was especially emphatic with regard to this point. "Notwithstanding the relatively mild symptoms present at the onset," he wrote, "the outcome of the disease is absolutely lethal." Knaebel (*loco citato*,[32] p. 6) spoke of keratomalacia "as nearly always a harbinger of impending death." Again, the statement made by Koun[21] (*loco citato*, p. 31) that "the appearance of keratomalacia is a sign of the impending dissolution of the little patient" is true only approximately.

That the underlying disease often ends fatally is unquestioned. A glance at any series of figures dealing with keratomalacia will at once show the truth of this statement. For example, of the eighteen cases reported by Knaebel[32], nine, or exactly one-half, died before they had reached the age of six months, two in the *Klinik* and seven at home. Death occurred in Braunschweig's[27] five cases—three in hospital, and two 12 and 25 days respectively after discharge from the Halle *Augenklinik*. In my own series of thirty-one cases the mortality amounted to thirteen, or 41.93 per cent. This number, however, is probably below the mark, inasmuch as some of my patients may have died soon after they passed from under my personal observation. Few can have been so fortunate as Baer[19], who saw five instances of keratomalacia, some of them severe, and who did not lose a single child. Again, Peltesohn[20] saw recovery ensue in two out of three cases. In the nine infantile cases of keratomalacia described by Thalberg[3], the mortality was one alone, or the remarkably small percentage of 11.11. Laas[30] believes that the prognosis *quoad vitam* is not so unfavourable as generally thought if suitable diet be given, a statement with which I find myself in accord.

I believe that age has a good deal to do with the issue, lethal or otherwise. For instance, the average age of my non-fatal cases was 294·5 days as compared with 177·7 days in the fatal cases. In fact, the older the baby the better are the chances of recovery. Another thing, doubtless not devoid of influence, is whether the child is or is not admitted early into hospital, inasmuch as the chances of recovery are clearly better in the former than in the latter event. Syphilitic and marasmic cases, in my experience, justify a better prognosis than those which are due to tuberculosis.

The interval between admission to hospital and death in my thirteen fatal cases ranged from one day to one hundred and nineteen days, and averaged 29·23 days. These figures dispose of Koun's[21] statement, which is to the effect that the children die in from one to four days after the beginning of the corneal lesion.

It is a matter of common knowledge that babies affected with keratomalacia often die from broncho-pneumonia. That condition was found, either during life or after death, in more than one-third of my fatal cases, the exact figure being 38·46 per cent. In some instances the pulmonary condition is unquestionably in the nature of hypostatic pneumonia, which is so often the cause of the fatal termination in cases of marasmus. I cannot resist a suspicion, however, that in another, and perhaps a larger, contingent the broncho-pneumonia merely represents the outstanding symptom of a generalised tuberculosis, which has escaped recognition.

As regards the cornea, the symptoms of keratomalacia may be summed up in the four words, *infiltration*, *ulceration*, *perforation*, and *cicatrisation*.

Both corneæ are usually affected, although not necessarily at the same moment or to the same extent. The disease was bilateral in 16 (59·25 per cent.) and unilateral in 11 (40.74 per cent.) of twenty-seven of my cases. In Knaebel's[32] eighteen cases the disease affected one eye in exactly one-half. Of the five

cases published in detail by Braunschweig[27] the corneal condition was bilateral in but two. On the other hand, in Thalberg's[3] thirteen cases (9 infantile and 4 adult) both corneæ were involved in all but two.

The first sign that I have myself seen is a slight dulness of the epithelium in some part of the lower half of the cornea, and under suitable treatment (as in case No. 25 of my series), this may clear and *restitutio ad integrum* come about. In the contrary event, the dulness is replaced by a definite infiltration of the corresponding part of the cornea. This may quickly spread, so that the entire cornea, excepting a narrow peripheral zone, in the worst cases, speedily becomes converted into a soft, greyish-white, pulpy slough, resembling damp wash-leather. Trivial photophobia (revealed by the baby keeping his eyes closed) or a whitish appearance of the eye, of which more will be said later, may be, and often is, the first thing noticed by the baby's friends. There is rarely any pronounced swelling, redness, or spasm of the eyelids, so that on opening the eyes of the baby, one receives quite a shock on seeing the destruction that has taken place. Neither is there lacrymation, nor chemosis, nor congestion of the eyeball, nor, indeed, any of the other appearances that we should naturally expect to find associated with so severe and destructive an affection. Indeed, to employ the graphic words of one of the earlier writers, J. N. Fischer[52], the eyes "have a corpse-like appearance in the still living body." As pointed out by v. Graefe, however, symptoms of irritation may come on later—that is to say, if the baby survive long enough for panophthalmitis to develop.

The eyes often look curiously dry and are more or less insensitive to stimuli, and in severe cases a very striking and characteristic feature is that the baby scarcely resents attempts to examine his eyes, or, at most, moans feebly and piteously during the necessary manipulations. This alone should arouse suspicion as to the nature of the case, suggest extreme care in handling the eyes, and, finally, prompt a bad prognosis.

In one very remarkable case in an infant of eleven months (No. 29) the clinical picture was identical with that of *ulcus corneæ serpens* as seen in the adult eye. The lower fourth of one cornea (the other had perforated some days earlier) was occupied by a trench-like ulcer, the lower edge of which was rounded off, while the upper one was purulent and overhung with epithelium. There was hypopyon. Pneumococci were found in material taken from beneath the ledge of epithelium overhanging the ulceration of the cornea.

A common accompaniment of keratomalacia, first mentioned by von Graefe,[1] is a small, triangular, greasy-looking white patch—an area of so-called "xerosis"—situated in the ocular conjunctiva on the outer or the inner aspect of the cornea.* It may be present in one eye with a transparent cornea, while the cornea of the other eye may be partially or wholly destroyed by keratomalacia, as in Krausse and Knaebel's cases. In several of my own cases the patch of xerosis lay below the cornea, and I have more than once seen the change encroach upon the cornea itself. I have often observed the entire cornea, or a considerable portion of its circumference, encircled by a narrow, slightly raised, glistening white line, occupying the position of the limbus, the conjunctiva near which is sometimes lustreless, dry, and wrinkled concentrically. This curious ring may or may not be associated with the triangular xerotic areas in the ocular conjunctiva, which, in my experience, are much less common. It is doubtless due, like the triangular area, to the lodgment and multiplication *in situ* of the saprophytic and

*This condition was called by von Graefe "acute xerosis," and described by him as affecting the ocular conjunctiva, which became, especially below and at the sides of the cornea, dull and dry and covered with fine scales, and wrinkled and loose when the eyeball was moved.

ubiquitous xerosis bacillus, together with local precipitation of the Meibomian secretion (Reymond). Once only have I seen the xerotic changes affect the palpebral conjunctiva. That was in the case of a child suffering severely from congenital syphilis, in whom each lower lid showed a dry, white, greasy-looking patch on its inner aspect. The changes of xerosis, as in case No. 25, may disappear in the course of a few days.

That xerosis of the conjunctiva may be absent from cases of keratomalacia has been pointed out by Horner, Zirm, Leber, Biber, v. Hippel, and Krausse. Xerosis was not observed in one-quarter of the cases of keratomalacia, sixteen in number, seen by Braunschweig[27] in the Halle *Augenklinik*. The xerotic patches, as pointed out by several writers, are not essential to the diagnosis of keratomalacia, although when present in little children, they are almost pathognomonic of that ailment. They were noted in thirteen of my own cases, or 41·93 per cent., and in 46·15 per cent. of Thalberg's[3] thirteen cases. On the other hand, in Knaebel's[32] series they were present in no fewer than 83·3 per cent. of the eighteen cases, and in all of Baer's[49] four cases.

Finally, it should be added that when the globe becomes red, as in commencing panophthalmitis, the xerotic patches are no longer visible.

In one of Leber's cases ulcerations existed upon the conjunctiva, ocular and palpebral.

If the baby's nutrition cannot be improved, the cornea is likely to perforate, a process usually ushered in by localized protrusions of Descemet's membrane, which manifest themselves as so many dark-coloured areas peeping through the pulpy, greyish slough, which covers, as a rule, most of the cornea. Hypopyon is common. Perforation is succeeded by escape of some of the contents of the eyeball, notably the crystalline lens, and the globe eventually shrivels up into a small, white, globular, sightless mass, lying in the depths of the orbit. In a second group of cases, the damaged eyeball, instead of undergoing phthisis bulbi, passes over into a state of secondary glaucoma, together with the remote bulging of its anterior segment, a so-called staphyloma. In still a third group the cornea becomes prominent without actual perforation having taken place (keratectasia). The result in any case is the same, namely, blindness. But the more common event in severe cases is for the baby to succumb to the underlying malady before there has been time for either phthisis bulbi or staphyloma to develop.

The singular paucity of inflammatory changes, especially of redness, has already been alluded to. But when the cornea has perforated, marked signs of reactionary inflammation are common. They may reach such a pitch, as in one of my cases (No. 15), as almost to arouse a suspicion that a gonorrhœal infection has been superadded to the keratomalacia. J. Thalberg[3] also mentions this point, and says that in two cases of the kind he reached the mistaken diagnosis of blennorrhœa with secondary gangrene of the cornea.

The destructive nature of the disease is shown by figures recently published by A. Schiele[53] dealing with thirty-three cases of keratomalacia seen in the Kursk district of Russia in the years 1904, 1905, and 1906. Thirteen of the children were rendered totally blind, and seven were blinded in one eye; two recovered with corneal blemishes; and eleven could not be traced. Of the nine children mentioned in Knaebel's[32] series who survived, eleven of the thirteen eyes affected (*i.e.*, five unilateral and four bilateral cases), were known to have been blinded by the disease.

At the same time there are cases and cases of keratomalacia. Some are mild, and others just the reverse. It is important to bear in mind that the progress of the disease may be arrested at almost any stage, with the consequent retention of a more or less useful eye. The common condition in

such cases is an incarceration of the iris in the leucoma (*leucoma adherens*), sometimes with the production of a capsular cataract, as happened in several of my own cases. Peltesohn[29] believes that the prognosis of the disease *quoad visum* is not so unfavourable as generally believed, since even in advanced corneal changes there may come about a restitution bordering on the miraculous.

Apart from the ocular appearances, the child presents the usual symptoms of marasmus—that is to say, progressive wasting, lax and withered skin, anæmia, characteristic look, subnormal temperature, and a marked tendency to diarrhœa and vomiting.

Cervical opisthotonos, the "retraction of the head" familiar to every practitioner, was noted in several of my cases of keratomalacia (Nos. 4. 5, 6, 9, and 15), but in one alone (No. 4) did it appear to indicate meningitis, as proved by the *post-mortem* examination. The condition is not uncommon in young children, as well known, under several circumstances, as, for example, marasmus, diarrhœa, middle-ear catarrh, pneumonia, etc., although it is probably never so marked as in post-basic meningitis, where the infant's head may be approximated to his heels. A case published by R. Schultz[40] is worth mentioning in this connection.—A baby, aged five months, the thirteenth child of a very anæmic mother, showed ulceration of one and infiltration of the other cornea, associated in each case with a pale and dry conjunctiva, covered with whitish, fatty-looking mucus. There was marked retraction of the head, which finally reached an extreme degree. Death from broncho-pneumonia. Yet at the autopsy, brain and meninges were found to be normal.

The "hydrocephaloid state," sometimes seen in marasmus and diarrhœa, was present in one of my patients (No. 5).

The possibility of confusing marasmus with latent tuberculosis has been mentioned previously. A remittent temperature, which need not reach a high point, is more suggestive of tuberculosis than of marasmus, pure and simple. Under such circumstances it becomes of importance to examine the lungs at frequent intervals, and to investigate the condition of the spleen and lymph nodes. Cough is another symptom that should make us suspect the existence of tuberculosis, and so are quickened respirations without obvious cause.

Despite the wasting, the appetite in some of my patients has been so voracious as to recall Gouvêa's[6] remark, that those suffering from Brazilian ophthalmia "will eat anything that happens to be placed in their hands."*

The diagnosis of keratomalacia should offer no difficulty to one who is aware of the existence of the disease. It is important to bear in mind that neither the existence of xerosis nor the presence of corneal changes in both eyes is essential to the diagnosis. It would, in my opinion, be a fair generalisation to say that ulcers of the cornea, especially if bilateral, in infants between the age of two and twelve months are far more likely to be due to keratomalacia than to any other cause. Such patients are too old for the corneal complications of gonorrhœal ophthalmia, and almost too young to suffer from the other great cause of corneal ulceration in children, *viz.*, eczematous keratitis. While this is true, it is curious to notice from the case-reports scattered throughout literature how often the symptoms of keratomalacia have been confused with those of ophthalmia neonatorum, notwithstanding the very different age-incidence of the two ailments. Indeed, sometimes the distinction between the diseases is not simple, as in one of my own cases (No. 30).

*Ullersperger[5] gives an account of an adult with "Brazilian ophthalmia" whose appetite was so ravenous that an iron mask had to be put over his face for the purpose of preventing him from tearing to pieces all the fallen fruit he could lay hands on. On one occasion, when without his mask, Ullersperger's patient swallowed four ounces of spirits of camphor.

Confusion, however, is much more likely to arise between keratomalacia and two conditions, both of which occur in childhood: (1) keratitis xerotica, and (2) tropho-neurotic keratitis.

(1) *Keratitis xerotica* (Feuer) is liable to occur in children, irrespective of age, who lie for long together in the semi-conscious state known as "coma-vigil" from whatever cause. The semi-closed eyelids allow the lower third of the cornea to be exposed to the air. The consequence is that that portion of the cornea becomes dry, and this, along with the grave general state of the child, allows the damaged cornea to fall a ready prey to any pyogenic micro-organisms that may chance to be present in the conjunctival sac. An ulcer, shallow at first but soon becoming deeper, forms near the lower margin of the cornea, and, if the child live long enough, this becomes complicated with deeper changes, which may lead to loss of the eye. The affection, so far as I have seen, is invariably bilateral, and is of slow progress compared with most cases of keratomalacia.

(2) *Tropho-neurotic keratitis*, a rare and painless disease of which I have seen two instances only in children, is caused by paralysis of the fifth cranial nerve. It gives rise to a peculiar appearance of the cornea, since the entire anterior epithelium is cast off except for a narrow rim at the extreme periphery. In its further course the cornea becomes cloudy, pus appears in the anterior chamber, and the eye is lost by suppuration, or, at best, is left with a corneal cicatrix in which the prolapsed iris has become entangled. There is anæsthesia of the conjunctiva of the upper and lower eyelid on the affected side.

Almost everybody, from Dr. Joseph Brown downwards, who has written about keratomalacia has compared the process, aptly enough, with that brought about in dogs fed, as in Magendie's famous experiment, with sugar and distilled water or other non-azotised food. In those animals an early and constant sign of inanition was furnished, as everybody knows, by sloughing of the corneæ and consequent destruction of the eyeballs.

Indeed, it cannot be doubted that keratomalacia is remotely due to lowered vitality in a tissue devoid of blood-vessels and exposed to slight injuries. The fact that in almost 50 per cent. of the cases the affection is limited to one eye, suggests that slight, inappreciable traumatisms may have a considerable determining share in the causation of keratomalacia. A case of my own (No. 16) may be briefly mentioned in connection with this point.—An ill-nourished child of fourteen months suffered from a sloughing right cornea, and, as a congenital defect, there was an incomplete coloboma of the corresponding upper eyelid. The inference was that the gap had allowed of some slight injury, as by an intruding foreign body, of the exposed cornea. I recall another case (not included in the present series) of a wasted infant admitted with double coloboma of the left upper eyelid, who suffered from severe and perforative ulceration of the corresponding cornea.

The corneal changes, in fact, appear to be analogous to the localized gangrene of the skin over the sacrum, the heels, and other bony prominences which is sometimes observed towards the terminal stages of athrepsia. Such acute bed-sores, for that is what they amount to, were noted in cases of keratomalacia reported by Baer[49] and Lagrange[50] and by Cabannes and Koun[51] respectively. They existed in one of my own patients. By Förster[52], of Breslau, indeed, it was supposed that pressure of the eyelids upon the enfeebled cornea was enough to determine ulceration, much as pretibial bed-sores are believed to be produced in typhoid fever and other severe constitutional diseases by the mere weight of the bed clothes. This view seems to be supported by J. Thalberg[53].

Horner, Zirm, and some other authors believed that the primary cause of the disease was to be found in desiccation of the corneal epithelium exposed by inadequate closure of the eyelids. My own experience does not support this view. At the same time the fact that the disease almost invariably begins in the lower half of the cornea is suggestive. Keratitis e lagophthalmo, which is unquestionably the result of exposure of the cornea, presents a different clinical picture. The fact that in almost one-half of the cases keratomalacia affects one eye alone is dead against the theory. Lastly, direct observation has convinced me that in the earliest stages of keratomalacia the lids are almost invariably kept shut, and that coma-vigil is seen only in the advanced stages—that is to say, when the patient has become dangerously ill and the mischief has already been done. My personal experience is borne out by a statement made by Krausse,[54] namely, that in the Jena *Augenklinik* one case alone of keratomalacia has been met with in which the lids were not closed completely. Many cases reported, however, including some of my own, expressly mention that the lids have kept more or less open.

I have learned to look with circumspection upon any corneal ulcer, no matter how trivial it may seem, in a baby who shows signs of malnutrition. A recent case (No. 26) points the necessity for this precaution.— A somewhat ill-nourished baby, aged eight months, suffered from symptoms of a mild conjunctivitis of the Koch-Weeks' type, and, in addition, from a trivial and localised dulness of one cornea. The cause of the corneal mischief was not immediately apparent. Unfortunately, no great importance was attached to the condition, and ordinary treatment was prescribed. A fortnight later, however, the baby again attended, and it was then seen that the condition of the cornea was most serious—it was sloughing and had a keratocele towards its centre. The patient was admitted to the Hospital, but too late to prevent the formation of an adherent leucoma.

Keratomalacia may be said to be a malady devoid of distinctive pathology. Dötsch[55], following the example of Ernst[56] and of Fuchs,[57] has insisted upon the importance to be attached to a deposition of keratohyalin in the superficial layers of the conjunctival epithelium, which he found to be present in the xerosis accompanying three cases of keratomalacia. This process of keratinisation he regarded as typical of the affection in question. These observations have been confirmed by Stephen Mayou[58] in so far as regards six cases of epithelial xerosis, an affection, as I have shown elsewhere,[59] not uncommon in England in the summer months amongst the inmates of poor-class residential schools. It is not, of course, associated with any destructive corneal processes. Mayou found a layer of keratin on the surface of the epithelium, with granules of keratohyalin in the deeper layers beneath it, and, further down still, a well-marked layer of prickle-cells. In Mayou's view, the essential change in the formation of the patches of xerosis is the keratinisation of the epithelium, to which the Meibomian secretion, known to include the xerosis bacillus, becomes adherent, owing to altered surface tension. Deficient lacrymal secretion is another factor in the causation of the change.

The coarse pathology of the case, however, will essentially depend upon the stage when the eye is examined. If before perforation has taken place, there will be more or less extended loss of the surface epithelium, an infiltration with round cells of the corneal lamellæ, together with other evidences of inflammation and ulceration of the cornea, about which there is nothing distinctive. Bowman's membrane will be missing from the ulcerated spot, while Descemet's membrane will persist practically unchanged. The iris and the ciliary body, even at this early stage, will manifest marked evidences of

inflammation. When perforation has occurred, the pathological picture changes according to several circumstances, the chief of which are the length of time that has elapsed between perforation and removal of the eyeball, and the septic accidents that may befall the globe. The common pathological appearance, however, is that of an adhesion of iris to cornea by connective tissue, round cells, pigmented cells, and blood-vessels of new formation. The ciliary body, sclera, choroid, retina, and optic disc are in a state of exudative inflammation, so that the vitreous humour usually includes more or less abundant inflammatory exudation.

In this place there is no need to describe the pathology of keratectasia or of staphyloma or of secondary glaucoma.

If the pathology of keratomalacia be not distinctive, neither is the bacteriology. Despite many investigations by various authors, no causal micro-organism has yet been identified. The microbes found in discharge from the conjunctiva or in scrapings from the cornea have included xerosis bacilli, staphylococci, streptococci, pneumobacilli, coli bacteria, and gonococci, as well as various cocci and bacilli not more particularly identified. In a remarkable case by Angus McNab[10], the bacillus coli communis was found with gonococci. This diversity and multiplicity of bacteriological results is strongly suggestive of there being no micro-organism peculiar to keratomalacia.

My personal investigations lead me to the same conclusion.—(a) In the patches of conjunctival xerosis, I have never yet failed to find the xerosis bacillus, sometimes alone but oftener associated with the commoner micro-organisms of the conjunctival sac, especially with the staphylococcus pyogenes albus. (b) As regards material taken direct from the corneal ulceration, the findings have been somewhat different.—As I have pointed out elsewhere, the pneumococcus is by far the commonest pathogenic organism obtained under those circumstances. In eleven of the cases which form the basis of the present communication the pneumococcus was present in five (or 45·45 per cent.), in pure culture in two and mixed with other microbes in three. Other micro-organisms found by me included the staphylococcus pyogenes albus (5), the xerosis bacillus (4), the staphylococcus pyogenes aureus (1), the Morax-Axenfeld diplobacillus (1), the gonococcus (2), the micrococcus catarrhalis (1), sarcinæ (1), the aspergillus fumigatus (1), and, lastly, a Gram-positive streptobacillus, which coagulated and acidified litmus milk in twenty-four hours, and which fermented lactose.

In two of my cases (Nos. 30 and 31) the gonococcus was found in scrapings from the affected corneæ. In both xerosis bacilli were also present. (Xerosis conjunctivæ was present in each patient.) In the one case (No. 31) the child's age, *viz.*, eight months, excluded anything like ophthalmia neonatorum, but in the other case (No. 30), the age was only six weeks, and there was a history of a mild non-bacterial conjunctivitis beginning a few days after birth. When the corneæ became affected, however, the symptoms of conjunctivitis were ill-marked, while those of sloughing cornea were characteristic, and xerosis conjunctivæ was present, in addition. Gonococci were found not only in discharge from the conjunctiva but also in scrapings from the corneae, and were confirmed by repeated culture on blood-agar. The baby was somewhat ill-nourished (weight, 7 lbs. 13 ozs.). Of the two views, namely, that this was an instance either of very mild ophthalmia with corneal complications, or else of keratomalacia the evidence points, I think, to the latter being the true explanation. So far as I know, the case by Angus McNab is the only one yet published where the gonococcus appeared to be the cause

of keratomalacia, although there the bacillus coli communis was also present. These three cases, *i.e.*, McNab's and my own, suggest that the gonococcus may, on rare occasions, affect the cornea to the exclusion, complete or almost complete, of the conjunctiva.

The xerosis bacillus is now known to be a mere saprophyte, an almost constant inhabitant of the conjunctival sac, healthy or diseased. Hence, the name proposed, the *bacillus conjunctivæ communis*, by Arnold Lawson[61] for this ubiquitous microbe. Most of the other bacteria included in the list are common enough even in conjunctivæ that to all appearance are healthy. It is probable that no particular micro-organism is associated with keratomalacia, but that lowered vitality and all that such implies in the defensive powers of the body in general and of the cornea in particular is enough to allow the commoner pyogenic organisms to exert their characteristic properties, and in that way to bring about the malady. The fact that the pneumococcus need not necessarily be present in keratomalacia proves that it is not essential to the suppurative process, although in my experience, it is the commonest cause of the latter. It has been found, in pure culture or otherwise by other observers besides myself—as, for example, by E. von Hippel[62] Knaebel[32], Braunschweig[27], and Doetsch[55].

We may conclude, then, that in no case has a specific microbe been found by any of the numerous observers who have investigated the bacteriology of keratomalacia.

The fact has already been mentioned casually that in four cases of syphilitic keratomalacia I succeeded in demonstrating the spirochæta pallida in scrapings from the diseased corneæ. In one case (No. 20) the discovery clinched an otherwise doubtful diagnosis.—The infant, aged three months, "snuffled," was wasted, and showed a few small ulcerated papules about the anus, together with slight splenic and hepatic enlargements. Both corneæ had sloughed. The syphilitic origin of the ocular symptoms was merely suspected until all doubt upon the point was laid at rest by the actual discovery of the treponemata.

Treatment.

The first requirement is to place the baby under the best possible conditions for recovery, and that is obviously in the hospital ward, where the details of feeding can be attended to properly, local remedies can be applied systematically, and where the child can be kept warm, if necessary in an incubator. The affection is one where careful nursing counts for a great deal, another reason (if one be needed) for treating the patient in hospital. It would, in my opinion, be an excellent rule in the casualty department of every children's hospital to admit for observation any badly-nourished baby who showed xerosis conjunctivæ or the least ulceration of the cornea. J. Thalberg[3] established such a practice at the Elizabeth Children's Hospital at St. Petersburg.

Treatment itself should be both *general* and *local*.

The *general treatment*, speaking broadly, is that suitable for marasmus. It includes the provision of a wet-nurse, if possible, and, anyhow, the administration of such food, predigested or otherwise, as the baby can be induced to take and to retain. Rotch[63] recommends that a milk mixture should be given "which contains a low percentage of fat, a high percentage of sugar, and a moderate percentage of proteids." Such a mixture is represented by the formula: fat, 0.5; sugar, 6·00; proteids, 1·00; lime water to 5·00. "Virol," an emulsion of bone marrow, yolk of egg, and malt extract, has appeared to me to be beneficial in these babies. Baer,[49] whose exceptionally happy experiences have been mentioned earlier, advocated the feeding of the babies

with milk and lime water. His treatment, in fact, consisted of little else! Holmes Spicer[13] recommended the administration of milk, properly diluted, cod liver oil, and raw meat juice.

The giving of alcohol in the form of brandy has seemed to me to be most useful. The first hint I had as to the value of stimulants in keratomalacia was gained from a case that fell under my notice several years ago.—A little boy, aged 12 months, was brought to me with the right cornea hazy. He was a tuberculous subject. A week later, despite the use of physostigmine, the cornea was represented by a greyish-white slough, the size of a threepenny bit, separated by a shallow trench from the unaffected parts. The eyeball was scarcely reddened, but, curiously enough, the upper retro-tarsal fold was extremely prominent, as the result of œdematous infiltration. The corneal process was associated with the presence of the staphylococcus pyogenes albus and sarcinæ. The baby was admitted to Hospital, but owing to some misunderstanding, was removed by his mother, an exceptionally ignorant, stupid, and obstinate person, after a few days' stay. Feeling interested in the case, I traced the child to his home in one of the poorest parts of London. The cornea was then disorganised, and the infant, reduced to skin and bone, and as yellow as a guinea, appeared to me to be on the verge of death. The mother, in answer to my enquiries, told me that the child was being fed on "drops of brandy." Some two years later, to my great surprise, the child, then in blooming health, was brought to the out-patient department of the Queen's Hospital, on account of a large staphyloma which had developed in the eye with keratomalacia. Operation was refused, but eventually the staphyloma was sunken by an accidental blow upon the eye.

Cod-liver oil has a distinct value, more especially if it be given not by the mouth but by inunction, say, of one drachm three or four times a day. It was recommended by Holmes Spicer[13] in 1893, who suggested that in cases where it could not be retained, a little cream might be substituted. Mori,[8] indeed, believes that keratomalacia is essentially due to a deficiency of fat. On this view, he has, in spite of the diarrhœa often present, used cod-liver oil, and by that means has succeeded in curing even severe cases of the Japanese "Hikan." Neats-foot oil, an old-fashioned remedy for wasting children in English country districts, has seemed to me to be as valuable as cod-liver oil, than which it is certainly more economical.

If syphilis be present, mercury must be given. The fact is significant that some of the cases of keratomalacia that have recovered (Zirm, Peltesohn, Evans) have done so under specific treatment. The rapidity of action, desirable in these desperate cases, is probably best secured by giving mercury with chalk, gr. ½ to gr. 1, three times a day, and by rubbing in fifteen grains—*i.e.*, a piece roughly of the size of a pea—of mercurial ointment every night. In order to prevent the medicine from being carried off by the bowels, it is advisable to combine with each dose of the mercurial gr. ½ of sodium bicarbonate and gr. 1 of aromatic powder of chalk. Sublimate baths were employed in one of Peltesohn's cases which got well. Intra-muscular injections of a soluble mercurial seem out-of-place in babies of tender age, a remark that applies with added force to intravenous injections.

The *local treatment* of the eyes will include the frequent use of douches of hot saline or boric lotion. By Gama Lobo and de Gouvêa great importance was attached to steam, at a temperature of 40° C., directed against the closed eyelids of the patient for fifteen minutes once a day or oftener. In the intervals between the application of the steam, the eyes were kept closed by means of a pressure-bandage. However this may be, hot boric fomentations are certainly of use both in limiting necrosis and in hastening separation of the slough.

Among antiseptics, those that have rendered me yeoman service are argyrol and quinine and hydrogen peroxide. The first-named has been employed as a 15 per cent. to 25 per cent. solution dropped into the eyes at frequent intervals. The second has generally been used, as recommended by Arnold Lawson,[64] as a lotion containing four grains of quinine sulphate to the ounce of distilled water, just enough sulphuric acid being added to ensure a clear solution. The quinine is freely applied to the eyes every four hours, and in the intervals, they are kept tied up with gauze soaked in the lotion. Hydrogen peroxide, employed as Merck's "perhydrol," serves several useful purposes in these cases. To begin with, it is a most efficient antiseptic, and has the advantage—no slight one in keratomalacia—of being perfectly innocuous. Secondly, it yields accurate information as to the progress of the corneal ulceration, for evolution of gas when the "perhydrol" is brought into contact with the ulcer, becomes less and less marked as the latter heals. To obtain the best results, however, the baby's eyelids should be separated by retractors (if necessary under general anæsthesia), and the "perhydrol" be allowed to form, as it were, a pool of liquid, at the bottom of which lies the cornea. Several editions of the "perhydrol" are employed, and the process is repeated once or twice a day.

The employment of physostigmine, strongly recommended by J. Thalberg,[3] who saw much of the disease in Russia, is endorsed by Holmes Spicer[13] and by Adolf Knaebel.[32] Thalberg laid some stress upon the use of an ointment containing about ½ per cent. of physostigmine in vaseline, as opposed to the use of a watery solution. The alkaloid might equally well be dissolved in sterile oil. My own experience has led me to place a high value upon physostigmine, which assuredly succeeds better than anything else I have tried in keratomalacia, unless it be pilocarpine. Now and then it is surprising to see how quickly the cornea casts its slough under the use of the remedy.

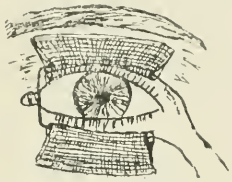
If the gangrene of the cornea can be mastered, the physostigmine should be replaced by atropine, also in oily solution.

It need scarcely be added that during the more acute stages of the disease the eyes should be kept tied up with a pad and bandage, and that the utmost care should be exercised in making the necessary examinations, applications, and so forth. The importance of care in this respect is shown by cases reported by Thalberg[3] and Biber[65] respectively, where the lens escaped from the eyes of babies on attemping to separate the eyelids. A precisely similar accident happened in one of my own cases.

As to surgical measures, I have seen an ulcer go on to perforation despite energetic treatment, as by scraping and the application of liquified carbolic acid, and the use of the galvano- or thermo-cautery. Several such cases are mentioned in the schedule to this communication. In keratomalacia it seems as if the vital powers were at so low an ebb that the cornea is unable to furnish the reaction necessary to healing. But that objection can scarcely be raised to the adoption of the Saemisch (or, rather, Guthrie) section, from which I have seen benefit when the cornea was falling into a state of keratectasia.* A remarkable case has been published by Dr. Thomas C. Evans[22] in which a large staphyloma, resulting from keratomalacia in a baby, was treated by multiple punctures with a Graefe knife. The operation was repeated at intervals of about a week for five weeks, at the end of which time the staphyloma is stated to have been replaced by a flattened corneal cicatrix, while the eye retained its shape and tension was normal.

* The operation of Kerotomy, as described in THE OPHTHALMOSCOPE of November, 1909, may also be usefully employed.

If the baby's eyelids are incompletely closed it will be advisable to suture them together, as in a case mentioned by Knaebel (*loco citato*[32], case No. 11), or to perform tarsorrhaphy. The ingenious little contrivance described by Dr. L. M. Francis[66], of Buffalo, would appear likely to be of service under



these conditions. A piece of gauze is cemented to the upper and the lower eyelid by means of flexile collodion. A silk thread with its free ends towards the outer canthus is placed in the creases, and the flaps of gauze are turned over and cemented to the fixed pieces of gauze. Then, by tying the ends of the thread, the edges of the lids are brought into apposition.

Conclusions.

1. Keratomalacia in young children is known to occur in practically every country the scientific records of which are available for inspection.
2. It affects children whose ages usually range from three to twenty months, and is especially frequent at about the eighth month of life.
3. It occurs chiefly in the children of the poorer classes.
4. It affects both eyes in about one-half of the babies.
5. It is associated with xerosis conjunctivæ in about 50 per cent. of the cases.
6. It occurs only in babies whose vitality has been seriously reduced by "epidemic" or "zymotic enteritis", congenital syphilis, athrepsia, or tuberculosis, named in their order of frequency.
7. In London its seasonal incidence closely follows that of zymotic enteritis.
8. Its mortality amounts to about 50 per cent. of those affected. The immediate cause of death is usually broncho-pneumonia or exhaustion.
9. It leads to blindness in about one-half of the children who survive.
10. It is associated with no specific micro-organism, although in scrapings from the cornea the pneumococcus may be found in about one-half of the cases.

APPENDIX.

Cases of Keratomalacia.

1.—Latham, Grace, 8 months. Admitted August 25th, 1807. Died August 26th, 1807.

History.—Born at term, the 12th in the family. Stated to have had no food other than her mother's milk. Although she has suffered from bronchitis since she was born, still she is stated to have been otherwise healthy until four months ago. Her general condition has become much worse during the last week. Five days before coming under notice, the mother noticed "a speck" on the baby's left eye, which is said to be sometimes "a little open during sleep."

Upon admission.—A wretchedly thin and marasmic infant, weighing seven pounds. Her skin is wrinkled and yellowish. No teeth. Temperature 97° F. L.E. a small quantity of yellowish-white discharge is present. A circular infiltration, 2 mm. in diameter, lies near centre of the inner side of the cornea, and there is a layer of yellowish pus in the lower part of the anterior chamber. No patches of conjunctival xerosis. There is hardly any redness of the eye, which looks dry, as it were. During sleep there is slight lagophthalmos of the lid.

Treatment and Progress.—Admitted to Hospital. Brandy and a mixture containing ipecuanha and ammonia given. The baby died at 4 a.m. on August 26th, 1897.

Post-mortem Examination.

A mass of cretaceous pus on vertex of right hemisphere below the pia mater, size of a one shilling piece. No meningitis. Brain otherwise normal. A cavity, the size of a small filbert, lies towards the base of the upper lobe of the right lung. Pleura around thickened, and universally adherent. The rest of the upper lobe contained numerous miliary tubercles. The other lung was healthy. No tubercle could be found in the other viscera.

Pathological examination of the affected Eye.

The central parts of the cornea are attenuated, the anterior epithelium being reduced to from one to three layers of flattened cells, and Bowman's membrane being absent. The cornea, as a whole, shows a dense infiltration with leucocytes. The vessels of the iris and ciliary body are gorged with blood. Both those structures are thickened and densely infiltrated, forming beautiful microscopical specimens of intensely inflamed tissues. The pigmented epithelium of the iris is in place. The angles of the anterior chamber filled with a fibrinous exudation including numerous pus cells and some pigmented particles. A similar exudation lines the posterior surface of the cornea, being now thick and again thin according to the exact part examined. No lens in specimen. Pars ciliaris retinæ covered with a layer of exudation. Retina, choroid, and sclera all inflamed and more or less disorganised.

2.—Maskell, Emily, 1 year. First attendance March 16th, 1898.

History.—A full-time child, born after an easy labour. A fine baby, quite healthy. For the first three months fed on breast exclusively, and after that breast and bread and biscuits. The breast was given up in January—that is to say, when the baby was about ten months' old. The food since then has included Nestlé's milk, fish, and potatoes. On *February 20th* the baby was taken with diarrhœa (stools loose and green) and sickness. She was cutting two teeth at the time. The child vomited every time she was fed, and the stools were very offensive. She wasted, and lay quite still in bed all the day long. Convulsions also made their appearance. This illness is said to have lasted for fourteen days, and since its end the child "has picked up very well." Further questioning brings out the additional facts that the baby was dangerously ill for three days, never moved, and kept the eyes shut. A yellow discharge was then present, and a medical man, who opened the eyes, stated that "ulcers were present."

Present Condition. R.E., adherent leucoma present in the lower-inner part of the cornea. L.E., a large scooped-out ulcer present in the lower part of the cornea, but without perforation. No redness of eyes, and no frothy conjunctival patches.

Progress.—*April 6th*, 1898. No redness of eyes.

3.—Brown, James W., 10 months. Admitted August 17th, 1898. Died September 8th, 1898.

History.—The baby has suffered from diarrhœa for about six weeks, and the eyes have been affected for some seven days. The baby has been brought to this hospital as a casualty, and some lotion was given, but the eyes have failed to improve. The baby does not sleep with open lids.

Upon Admission.—A very thin, wasted, and weakly baby. Has diarrhœa. A large sloughing ulceration is present over the lower part of each cornea. No frothy patches in ocular conjunctiva. Signs of inflammation not at all pronounced.

Progress and Treatment. The corneal ulcers were touched with the liquified carbolic acid of the British Pharmacopœia. The after-treatment included drops of atropine and cocaine, and hot fomentations applied to the eyes every four hours. *August 19th.*—Iodoform to be dusted twice a day over the corneal ulcerations. *August 23rd.*—Baby seems better. No diarrhœa. Pupils not much dilated, but the corneal ulcerations are looking better. Ung. Flav. et Atrop., bis die. Atropine drops to be continued. *August 27th.*—Although the eyes have improved, the baby himself is not so well, and diarrhœa has started again. *September 7th.*—Child much emaciated. He lies with semi-closed eyelids, and presents at the lower third of each cornea a dense opacity, the surface of which is somewhat depressed. Pupils dilated; they are free from adhesions. No pus in anterior chamber. Corneal sensibility unimpaired. *September 6th.*—Baby suddenly became worse and died this evening.

Until the morning of August 29th the temperature remained below 99·4° F. On the day named, however, it was on successive occasions 99·6° F., 100°F., and next day in the morning 102° F., but by night had fallen to 97·8° F. From then to death, nine days later, it remained subnormal.

Stools 0 to 4 a day.

No *post-mortem* examination could be obtained.

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4. Thornhill, Walter, 8 months. Admitted December 14th, 1898. Died February 5th, 1899.

History. The baby, when about six months of age, attended Moorfields, where a diagnosis of "purulent ophthalmia" was made. Dates of attendance were from September 22nd to November 15th. The left eye is said to have been affected for a week. Six days ago a speck was noticed upon that eye, and the speck is stated to have got bigger since.

Condition on Admission. A weakly-looking baby, with eczema behind the ears. L.E., the lower and outer quadrant of the cornea is occupied by a slough, the remainder of the cornea being cloudy. No pus can be seen in the anterior chamber. Palpebral conjunctiva reddened. Muco-purulent discharge. There is a good deal of ciliary congestion.

Treatment and Progress.—Under A.C.E., the slough was scraped away, without opening the cornea, and pure liquified carbolic acid was immediately applied to the floor and edges of the ulcer. Atropine drops (grs. 2), ter die; iodoform to ulcer, bis; pad and bandage. *December 16th.*—There is not much change in the condition of the eye, the pupil of which has not responded in the least to atropine. Sores on face and head. *December 19th.*—Child seems ill in himself. Cervical opisthotonos. L.E., lids swollen. Conjunctiva reddened, and some muco-purulent discharge. Ciliary redness rather less marked. Cornea rather clearer, but whitish slough lies over position of abscess. It is, however, difficult to obtain a good view of the cornea even with retractors, as the child persistently turns the eye outwards. Pupil not dilated. *December 23rd.*—Perforation lower part left cornea with prolapse of the iris. Pupil not dilated, in spite of the atropine (drops and solid) that has been applied and the leech used to the temple. *December 29th.*—Lids less swollen. There are one or two pinkish patches in the cornea, the substance of which is cloudy. Pupil not well dilated. Sores are still present on the face and head. *January 11th*, 1899. Mercurial inunction and Hydr. c. Cret., gr. i, *omne nocte*. Child drowsy and languid. Some nasal discharge. Sores have healed. The lungs show no physical signs, but the baby is evidently ill. The left eye is better, and the conjunctiva clear. *January 18th.*—Temperature has become very intermittent, and the pulse is occasionally a little irregular. There is nothing definite in the right fundus oculi, but it seems indistinct. *January 25th.*—Baby is undoubtedly worse. More drowsy. Pulse 100, irregular, compressible. Mercurials stopped. *January 28th.*—Brandy, thirty drops every two hours. *February 1st.*—Temperature rose suddenly to 102° F. Respirations 48, with a tendency to the Cheyne-Stokes character. Child very drowsy. *February 2nd.*—Takes food badly. Pulse small and irregular. Respirations, 36 to 48 per minute, markedly Cheyne-Stokes in character. *February 3rd.*—Baby restless. Respirations, 56 per minute, shallow and less markedly of the Cheyne-Stokes character. Pulse, irregular, 108 per minute. Temperature 98° F and 97·4° F. Baby fed with nasal tube. *February 4th.*—Baby evidently sinking. Pronounced pallor. Respirations, shallow, 88 to the minute. Pulse 172, thready. In evening child became restless, unable to take any nourishment, and at 10 o'clock p.m. temperature rose to 107° F. At 11 o'clock p.m. two minims of morphia injected. The child died at 3.25 p.m. on February 5th, 1899.

Stools.—1 to 2 motions daily during stay in Hospital.

Temperature.—Temperature remained about normal until January 5th, when it rose to 101·6 F. On the evening of January 6th, it fell to normal, and remained so until January 13th. It then alternated from 97·8°F. to 100·4° F. until January 31st. On February 1st it rose to 102·2°F. On February 4th the evening temperature reached 106·6°F. The temperatures recorded on the day of the baby's death were—99·4°F., 97°F., and 97·4°F.

Pulse and Respirations.—February 1st, P.116, and R.48; February 2nd, P.96, and R.36; February 3rd, P.108, and R.56; and February 4th, P.172, and R.88.

Post-Mortem Examination.

February 6th, 1899.—Body very wasted. Left eye shows signs of severe inflammation. Pleurae: no adhesions and no excess of fluid. Lungs: no signs of tubercle and healthy. No evidence of tuberculous softening in the bronchial or mesenteric glands. Pericardium: neither adhesions nor excess of fluid. Heart: healthy; orifices contracted. Valves: healthy. Brain: very soft in places, especially left frontal lobe; no tubercle seen on arteries or on surface of brain. No actual abscess, but excess of purulent fluid in ventricles, and purulent exudation on basal surface. Abdomen, spleen, kidneys, genito-urinary tract, liver, and alimentary canal free from morbid changes. Eye (left): signs of acute inflammation; the optic nerve manifested no naked-eye evidences of inflammation.

Diagnosis: general meningitis.

Examination of the Eye.

Macroscopic.—Leucoma with adhesion of the central parts of the iris and the anterior pole of the lens to the cornea.

5.—Payne, Selina, aged 6 months. Attended Evelina Hospital on July 20th, 1900. Death on July 30th, 1900.

History.—This child, the third in the family, was born at term after a natural labour. The eyes have always been "weak," and running with yellowish-white matter since birth. The nose also has run continuously.

On July 14th the baby was seized with diarrhœa and convulsions. On the 16th she was brought as an out-patient to the Evelina Hospital, where she was treated with bismuth and a mixture containing castor oil.

The bowels are said to act at least ten times a day, and the stools are watery, of light colour, and offensive to the sense of smell. There is now no vomiting. The baby has been losing flesh quickly. She is said to be subject to "inwardly convulsions," during which the eyes get fixed and the arms and legs became stiff. Since the illness began on July 14th the child has been noticed to sleep with her eyes half-open, and to throw her head back.

The baby was fed on the breast for the first month of her life. Since then she has had no other food except boiled nursery biscuits, together with milk and barley water (equal parts).

On admission.—A wasted baby, who weighs 10 lbs. 12 ozs. She suffers from diarrhœa and vomiting. The retraction of the head and the "scaphoid" abdomen suggest that she may be suffering from basal meningitis. Her temperature is of a very fluctuating character, reaching 103·2° F. on one occasion.

Eyes.—The corneæ are clear. The peculiarity of the case is that the lower half of each cornea is encircled by a narrow glistening white line at the limbus, and in addition to that, a small area of xerosis lies in the conjunctiva on the outer side of each cornea.

Both corneæ at a later stage in the case began to slough, but unfortunately the notes give no more precise details. It is, however, certain that the baby died ten days after she was first seen by me.

Bacteriological Report.—Cover-glasses were smeared and serum tubes inoculated from the whitish material lying at the limbus. The former contained Gram-positive cocci and bacilli, which were identified by culture as staphylococcus pyogenes albus and xerosis bacillus.

6.—Bennett, Ernest, 4 months. Admitted to the Queen's Hospital on February 26th, 1902. Death on May 17th, 1902.

Baby brought to out-patients on February 26th, 1902, suffering from ulceration of the corneæ. He was a full-time child, and said to have been well-nourished at birth. A week after birth he refused to "suck," and since then has been fed with great difficulty on cows' milk and barley water. No history of ophthalmia neonatorum. Never "snuffles" or has any rashes or other signs of congenital syphilis. The child stated to have had a "fit" on the eighth day after birth. He is the youngest of four children, of whom the other three are said to be healthy. The eyes are stated to have been bad for about one month.

On admission. He is a puny, apathetic, wasted baby, weighing in the nude 8¼ lbs. only. There is no evidence of syphilis. T. 97·4° F. R.E. A small infiltration lies towards the centre of the cornea and stains faintly when treated with fluorescein. T.n. L.E. A large and dense infiltration, which stains deeply with fluorescein, covers the centre of the cornea. There is merely a trace of ciliary redness. The eye looks dry, as it were. No inflammatory changes in the eyelids. No changes in the palpebral conjunctiva. Tear passages normal. T.n. The eyes can be examined and cleansed without the baby evincing the least sign of discomfort. Its silence and apathy, indeed, are striking features of the case.

Admitted to the Hospital

Treatment and Progress.—*February 27th.* Patient seems to be more lively. Takes milk fairly well. Brandy, five drops every two hours. *March 5th.*—Child now weighs 7½ lbs., so that he has lost one pound since admission to the hospital. T. has not risen above 99·8° F. The bowels are usually opened three times a day, but sometimes not at all. Head is retracted. R.E. ulcer has healed, and is now replaced by a small more or less central nebula. L.E. trifling dusky ciliary redness. The entire pupil is hidden behind a purulent ulcer of the cornea. Pus can be recognised towards the outer side of the anterior chamber. The almost complete apathy of the infant is very marked. No physical signs in the chest or abdomen. *March 7th.*—Condition much the same. Head is, however, more retracted, and since yesterday there has been a discharge from both ears. A few rhonchi to be heard in the lungs. R.E. condition unchanged. L.E. ciliary redness more marked. There is a clear spot in the centre of the ulceration (keratocele). The hypopyon has spread to the upper part of the anterior chamber. Patient takes food rather better. *March 9th.*—The whole of the left cornea is now involved by the purulent infiltration, and the cornea is on the point of perforating. The cornea surrounded by injected zone. Child's general condition is about the same—still takes milk well. Otorrhœa. No retraction of head during last week. During the last few days the ulceration has extended and the whole cornea is now covered by a white slough, in the centre of which is a clear area, gradually increasing in size. Vascularity of the ocular conjunctiva has increased, and there is now a very distinct ring of radially arranged dilated vessels around the edge of the cornea. When seen at 11 p.m. child was in his usual condition. On being looked at ten minutes afterwards, however, the ulcer was found to have perforated, and the extruded crystalline lens to be lying outside the eye at the inner canthus. The vitreous was bulging towards into the opening in the cornea. This untoward event has not in any way disturbed the patient's equanimity. *March 10th.*—Opening in cornea now concealed by a whitish material. Eyelids inflamed. *March 12th.*—Weight 7 lbs. The left eyeball is in a condition of panophthalmitis, and is somewhat proptosed. *March 18th.*—The left eye is quite disorganised, and is discharging pus. No inflammation of eyelids now. *March 19th.*—Weight, 7 lbs. General condition unchanged. Left eye still discharging. *March 26th.* No change. Weight, 7 lbs. *April 2nd.*—Weight, 6¾ lbs. General condition unchanged. The left eyeball is now shrunken, discharges but little, and signs of inflammation have almost disappeared. Mist. ol. morrh. et ferri, one drachm three times a day. *May 7th.*—The left eye is now represented by a small nodule, free from redness, lying in the orbit. A button of granulation tissue exists in the former site of the cornea. Physical signs being detected in the baby's chest, I requested my colleague, Dr. J. H. Sequeira, to examine the case. His report is appended :—

"There is evident consolidation of the left upper lobe, with breaking down of the lung. There "are enlarged glands in the mesentery, and the spleen also is enlarged, being easily palpable a finger's "breadth below the costal margin. I consider the lung and glands certainly, and possibly also the "splenic trouble, as tuberculous."

May 13th.—Local conditions unchanged. *May 17th*, 1902.—Death. Autopsy refused.

During the three months the baby remained in hospital successive weights were : 8¼ lbs., 7½ lbs., 7 lbs., 6¾ lbs., 7 lbs., 6¾ lbs., 7 lbs., and 6¾ lbs.

7.—Barnett, Kathleen, 7 months. Out-patient June 11th, 1903, to June 18th, 1903. Admitted June 18th, 1903. Discharged August 6th, 1903

History.—Patient, the 14th child, born at term. For three weeks the patient was on the breast,

and since then has been brought up on Ridge's food and Nestle's milk given together. The mother suffers from paralysis agitans. The 12th child in the family, a girl, died when three months of age, with eyes like those of the present patient—"almost out of its head at last," to quote the mother's own words.

Present state.—When seen as an out-patient the child's condition was as under:—

A pallid, wasted baby, weighing nude 10 lbs. affected with lichen urticatus and evidently very ill. No purulent discharge from the eyes. Each cornea is ulcerated. Lies apathetically in mother's arms. Cries feebly when touched. Thrush on palate, etc. R. cornea shows a keratocele in lower-inner quadrant of cornea, surrounded by a sloughy infiltration. About one-third of the left cornea is involved by an ulcer covered with a greyish-white slough. A very small, white, glistening, scaly patch of xerosis lies in the ocular conjunctiva of each eye on the outer side of the cornea. Eserine drops (grs. ii.) thrice a day and the eyes meanwhile to be kept tied up. Cow's milk and meat-juice prescribed.

A week later (June 18th, 1903) the baby's condition was so much worse that she was admitted into the hospital.

Upon admission.—Baby is very white and extremely apathetic, so that attempts to examine the eyes are scarcely resented. R.E. the cornea is sloughing with a keratocele at the lower-inner part. L.E. one-third of the cornea is engaged in a greyish-white slough. T. 99.8° F., and 98.4° F. Eyes to be treated with compressive bandage, hot boric fomentations, and physostigmine (2 grains to the ounce). Generally, milk, lime water, Valentine's meat juice, strychnine, and syrup of the iodide of iron, thirty drops three times a day.

Treatment and Progress.—*June 20th.* Weight 10 lbs. *June 22nd.* T. 98° F., and 101·4° F. Condition of eyes about the same. There is some bronchitis, but no evidence of tubercle can be obtained. *June 23rd.*—One drachm of brandy three times a day. *June 25th.*—T. 97·6° F., and 98·6° F. P. 120. R. 32. Child rather better, with a more vigorous cry. Food taken well. Eyes now free from redness and xerotic patches. Adherent leucomata in R. down and in-, and in L. below. In each eye part of the pupil is visible. Baby looks as if she might recover. *June 26th.*—T. 98·4° F. morning and evening. P. 132. R. 32. Weight 10¼ lbs. *July 1st.*—T. 98° F. and 98·4° F. Weight 11 lbs. Baby taking food well. During the last week there has been a frequent cough. *July 2nd.*—Neither redness of eyes nor xerotic patches now present. R.E. a small adherent leucoma lower-inner quadrant of cornea. L.E. small adherent leucoma immediately below pupil. The baby has gained three-quarters of a pound since admission to the hospital. Brandy, physostigmine, and boric fomentations to be continued. *July 6th.*—Child examined by my medical colleague, Dr. George Carpenter, who was kind enough to make the following note:—"The infant is obviously rickety. The ribs are markedly beaded, and the long bones are plus. She is a little pale. Has a little bronchitis and probably adenoids (there are post-nasal 'snuffles'). Pot-bellied. Spleen and liver a finger's breadth below costal margin. No evidence of tubercle and nothing to suggest tubercle."

July 16th.—Weight 11½ lbs. *July 22nd.*—General condition of child better. It takes its food well, and is gaining weight. The eyes remain much in the same condition as noted already. *July 23rd* and *July 31st.*—Weight 11½ lbs. *August 6th.*—Weight 11½ lbs. Baby now quite well. Eyes free from redness, with adherent leucomata as noted. Baby discharged, cured, from hospital.

The child, now aged 2½ years, was again seen on April 13th, 1905 *i.e.*, twenty months after her discharge from Hospital on account of phlyctenular conjunctivitis affecting the left eye. She was still a miserable looking child, weighing, naked, only 11 lb. 4 ozs. There was a small adherent leucoma in the lower nasal quadrant of the right and in the lower fourth of the left cornea. From the position of these leucomata no very serious impairment of sight should be produced.

8.—Crockett, Thomas, 1 year. Admitted August 6th, 1903. Discharged November 17th, 1903.

History.—The child was fed on the breast for three months, and since then on Nestle's milk and barley water. Biscuits and cakes have been given to him at times, but usually "he has not kept them down." One month ago the child had measles, and since then has wasted away and has been fretful. The left eye is stated to have got bad three weeks ago. It appeared to be red, was continually running, and was usually kept closed tightly. Is the fifth child in the family.

On admission.—The baby looks ill, and is badly nourished, weighing 9¾ lbs. R.E. in the centre of the cornea is an epithelial denudation, which stains with fluorescein. L.E. a leucoma adherens lies below the centre of the cornea. A suggestion of xerosis is seen below the leucoma.

Treatment and Progress. Brandy, one drachm every six hours. Atropine drops twice a day. Both eyes to be kept covered with a pad and bandage. *August 24th.*—Since admission the child has gained half a pound in weight. He seems vigorous. The temperature kept about normal until the 20th instant, when it rose at night to 100° F. Since then the evening temperatures have been 98·4° F., 102° F., 101·2° F. The recorded temperatures to-day have been 99° F., 97·6° F., 100° F., and 98·2° F. A glandular enlargement is present on the left side of the neck. *August 26th.*—The temperature since date of last note has still shown a tendency to rise at night to 100° F., 101° F., and once to 102° F. The swelling in the neck is smaller. *September 9th.*—Although the swelling in the neck is smaller, yet it is now soft and fluctuating. An incision evacuated pus. The baby is gaining weight. Condition of eyes much the same. *September 28th.*—Since the operation the temperature has kept about normal. The child since admission has gained three-quarters of a pound, and has altogether improved. *October 1st.*—Atropine to be replaced by yellow ointment, applied last thing at night to the eyes. *October 25th.*—Child does not gain in weight, being still only 9¾ lbs. Both pupils react to light, the right better than the left. R.E. appears to be normal. L.E. the whole cornea is more or less cloudy.

and the leucoma adherens remains as noted. Mist. Ol. Morrhuæ c. Ferro, one drachm thrice a day. *November 12th*, 1903.—The eyes present no signs of inflammation. The lower half of the left pupil is covered by a small adherent leucoma. *November 17th*, 1903.—Discharged.

Weight. Successive weights were as follows: 9¼ lbs., 9¼ lbs., 9¼ lbs., 9¾ lbs., 9¼ lbs., 9⅞ lbs., 10 lbs., 10 lbs., 10¼ lbs., 10¼ lbs., 10 lbs., 10⅛ lbs., 10 lbs., 10⅛ lbs.

Stools. Motions varied from 0 to 3 a day. **Pulse** 144 to 168 per minute, and **respirations** 32 to 40 a minute.

When seen as an out-patient on *November 26th*, 1903, the right eye showed no change, while as regards the left, a leucoma adherens was present below the centre of the cornea.

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9. Tofts, Sarah, 8 months. Admitted to Queen's Hospital, June 11th, 1903. Died October 8th, 1903.

Baby born at term. Child fed on cow's milk and barley water, and then with Nestle's milk. Child has always been ailing. Five weeks ago she was vaccinated, and since then has wasted, and, as the mother says, "the eyes got bad through vaccination."

On admission.—The baby is markedly wasted, weighs 9⅞ lbs., is feeble, pallid, and looks ill. Bridge of nose slightly depressed. Universal lichen urticatus. Coppery papules about anus. Urine 1010, pale, free from albumen. T. 97·6° F. R.E. a white patch of xerosis lies in the ocular conjunctiva on the inner and the outer side of the cornea, which shows a perforated ulcer. L.E. a yellowish slough (notes say "staphyloma") covers two-thirds of the cornea. Xerotic patches as in right eye. The child was admitted to the Hospital, and the treatment prescribed included boric fomentations every four hours, inunctions of mercurial ointment, brandy one drachm every four hours, milk, and Valentine's meat juice

Progress and treatment. *June 14th.*—T. 97° F. and 98° F. *June 17th.*—"Brown pustules now present both corneæ." Weight 9⅞ lbs. *June 22nd.* General condition better than on admission. Retracted head. Kernig's sign slightly present; T. 97° F. *June 25th.*—T. 98·4° F. and 98° F. The child, who is better in herself, has now a vigorous cry. *July 1st.* Although the baby has a voracious appetite, she does not seem to be making much progress. However, she has gained 4 ozs. since admission, since her present weight is 10 lbs. T. 98·4 F°. No redness of eyes or xerotic patches. Leucoma adherens both eyes. *July 6th.*—For the following note I am indebted to my medical colleague, Dr. George Carpenter:—"This infant has a cluster of *cutaneous gummata* on the right buttock, and a "blind boil" on the right loin. The ribs are beaded, but otherwise there is nothing special pointing to rickets. The head is retracted, and if interfered with, it arches its back and its head and heels approximate, although they do not touch. The retraction of the head varies from time to time. Baby is not anæmic. It cried and whined during examination. I did not obtain any evidence of tubercle, and my impression is that it is *a syphilitic child*. It has marked 'snuffles' and craniotabes. Muscles and bones normal. Nourishment of body might be considerably worse."

July 22nd.—Child does not seem to improve despite the administration of mercury and chalk, of which one grain twice a day was prescribed on July 8th. *July 23rd.*—One grain of mercury with chalk four times a day. *August 3rd.*—Weight (10 lbs.) stationary during the last three weeks. *August 6th.*—Brandy two drachms every four hours. *September 1st.*—Weight 9½ lbs. The rash is better at times. She suffers from recurrent attacks of boils (? cutaneous gummata). *September 16th.*—Weight 9 lbs. T. 98° F. and 98·2° F. *September 23rd.*—Weight 8½ lbs. T. 98° F. and 98·2° F. From September 25th to September 29th the temperature rose on two occasions to 101° F. and 101·4° F., and showed several smaller elevations. *September 30th.* T. 97·4° F., 98° F., 98·2° F., and 98° F. The child is much weaker. Weight 8½ lbs. Diarrhœa with offensive stools. Lids of left eye swollen on awaking this morning. *October 8th.*—General condition became gradually worse, and the baby died in an asthenic state at 6 p.m. to-day. The temperature has been normal or slightly subnormal since the 3rd instant.

Stools.—From the date of admission (June 11th) to July 28th the stools varied from one to three a day. They then increased in number from two to six a day, and this continued without material alteration until the infant's death on October 8th, 1903.

Weights.—Successive weights were: (Admission) 9⅞ lbs.; (June 17th) 9¼ lbs.; (June 24th) 9⅞ lbs.; (June 30th) 10 lbs.; (July 8th) 10 lbs.; (July 15th) 10 lbs.; (July 22nd) 10 lbs.; (July 29th) 10 lbs.; (August 5th) 9⅞ lbs.; (August 12th) 9½ lbs; (August 19th) 9½ lbs.; (August 26th) 9⅞ lbs.; (September 2nd) 9½ lbs.; (September 9th) 9½ lbs.; (September 16th) 9 lbs.; (September 23rd) 8½ lbs; (September 30th) 8½ lbs.; and (October 7th) 8½ lbs.

Post-mortem Examination.

Autopsy made twenty hours after death. Rigor mortis present. Body extremely wasted and marantic, with old, wizened appearance of face. No superficial swellings. Heart: small and pale. Lungs: œdema of bases and slight bronchitis; no consolidation. Liver: very full of blood, large, not fibrotic, darkly bile-stained. Spleen and kidneys normal. Mesenteric glands: a few show slight enlargement; no tubercle. Intestines: very shrunken, no ulceration. Brain: marantic, wasted, especially frontal region. Excess of fluid. No trace of meningitis. No tubercle in substance or on surface.

Pathological Examination of the Eyes.

(First Eye.)—The cornea varies much in thickness, and is mainly converted into vascular fibro-nuclear tissue, to the back of which the remains of the iris are wholly adherent. It is covered by an irregular layer of epithelium, the cells of which are more or less uneven, stain badly, and are

vacuolated. Particles of pigment, derived from the iris, are present in the thickest parts of the pseudo-cornea. No trace of Bowman's membrane can be made out. Descemet's membrane, in some of the sections, can be found towards the periphery of the anterior chamber. Ciliary body pigmented and atrophied. Peripheral zone of lens markedly vacuolated. Lying upon the anterior pole of the lens, below the capsule, is a small pyramidal mass of laminated tissue, staining almost homogeneously with eosin. Some remains of the anterior capsular epithelium seen between this cataract and the capsule. Sclera, choroid, retina, and optic nerve all show signs of inflammation, as evidenced by distension of vessels and hyperæmia. In certain specimens Descemet's membrane can be recognised towards angle of the anterior chamber, between cornea and iris, with its free end coiled up.

(Second Eye). The specimen contains no crystalline lens. The corneal lamellæ, altered in direction, infiltrated with small round cells, and containing blood-vessels, extend from the limbus for a longer or shorter distance into the cornea, and are then replaced by tissue possessing a very remote resemblance to corneal tissue proper. Descemet's membrane could be recognised in places, but no trace of Bowman's membrane was seen. The pseudo-cornea, as it may be called, is covered in front with imbricated and irregular epithelium, and behind by proliferating and hyperplastic uveal pigment, and is made up of round cells, fibres, blood vessels, and pigmented cells. Its central parts, extremely attenuated, consisting of round and pigment cells merely, even the anterior epitheloma being missing in most of the sections examined. The iris, much changed in texture, is adherent to the cornea, and takes part with the latter in forming the pseudo-cornea. The ciliary processes are stretched towards the axis of the globe, while extending across, from one side to the other, is a fibro-cellular exudation of inflammatory products derived from the processes. Ciliary muscle, sub-conjunctival tissue, choroid, retina, and sclera, as far as they could be examined, were infiltrated with small round cells.

10.—Graves, Rossetta, 12 months. Admitted to the Queen's Hospital for Children, London, on March 30th, 1903, and discharged April 24th, 1903.

History. The patient, who was born towards the end of the eighth month of pregnancy, has been fed upon the breast, with an occasional crust. She is the fifth in the family. One child died at $3\frac{1}{2}$ years from scarlet fever. The others are alive and well.

As a baby she was never strong. For the last seven weeks she has been suffering from "bronchitis," according to her mother's statement, and during her illness, discharge has been noticed to run from her eyes and nose. For three or four days she lay in a state of coma-vigil, and a week ago, when her medical attendant opened the lids, he found that her left eye was inflamed. He therefore recommended that she be sent to the Hospital. His diagnosis of the case is said to have been "meningitis."

Present state (*March 23rd*, 1903).—The child (examined in the out-patient department) is white and evidently very ill in herself. She "snuffles," but there is no history of syphilis. There is stiffness of the neck, and Kernig's sign appears to be present.

The right cornea is clear, but the case is very different as regards the left cornea, three-fourths of which are converted into a yellowish, pultaceous mass, evidently representing a sloughing ulceration which has perforated. Through the relatively clear portion of the cornea, which is situated upwards and outwards, it can be seen that the iris has become incorporated with the slough. No xerosis is present

Progress and Treatment.—Hot boric fomentations and powdered iodoform locally to the left eye.

The child was admitted as an in-patient under my care a week after she was first seen, and on the following day the ulcer of the left cornea was treated with the galvano-cautery. The following report upon the child's general condition was made by my colleague, the late Dr. George Carpenter:

"The child has a large head and widely patent fontanelle, which is flattened and not raised. There is a chronic discharge from the nose and by digital examination adenoids can be felt. The ends of the long bones are not enlarged nor are the ribs tender, and apart from the pothelly and widely open fontanelle, the child does not appear to be ricketty. The spleen is enlarged, but the liver is not so (two fingers below the ribs.) The limbs are short for the trunk. The forearms seem specially short and the leg bones generally. The child has lichen urticatus. She is a little pale but not markedly so. There is some scarring over the left index metarcarpo-phalangeal joint, said to be secondary to rubbing her nose when she was ill. The child appears to be of defective intellect. It has no notion of sitting up. It moves its limbs. The condition of the trunk and short limbs is rather like achondroplasia. There is no evidence of syphilis. The child can hold up its head. There are two symmetrical holes on either side of the sagittal suture, about three inches from the lambdoidal suture."

The child was discharged from Hospital on *March 30th*, 1903, with the ulcer replaced by a partial staphyloma of the left cornea.

On *May 21st*, 1903, the child attended as an out-patient. She was better in herself. There was a large adherent leucoma of the left cornea. On *June 25th*, 1903, she attended again. Her colour was ghastly, and she was wretchedly thin, weighing only 14 lbs., although she was fifteen months' old. When her eyes were examined, she moaned feebly instead of crying as a more vigorous child would have done. The right eye was normal. The left eye showed a large adherent leucoma.

11.—Carpenter, Frederick, 7 days. Admitted to Evelina Hospital under Dr. Nestor Tirard, on October 17, 1904. Died November 13th, 1904. An eight months' child.

On admission, very jaundiced, but sclera not much affected. Weight, 4¼ lbs. Umbilicus healthy. Heart and lungs healthy. T. 96·2° F. and 97° F. Some little mucopurulent discharge observed from both eyes. A diagnosis was made of syphilitic cirrhosis of the liver. On the following day the left cornea looked steamy, and the iris reacted sluggishly to light. On October 22nd the cornea of that eye appeared to be sloughing. *October 22nd.*—A lotion containing two grains of the acid hydrochloride of quinine to the ounce of distilled water to be used to the affected eye every four hours. *October 24th.*—L.E., the whole of the corneal epithelium is shed except for a narrow rim concentric with the limbus. A diagnosis of keratomalacia was made. No micro-organisms could be found either in cover-glass preparations or in tubes of nutrient material inoculated with discharge from the affected eye. *October 26th.*—Physostigmine drops, gr. 1 to the ounce, to be used three times a day. *November 3rd.*—Dr. Leathem, pathologist to the Hospital, reports that cocci, in pairs and in small groups, staining with Gram, and that xerosis bacilli were found in smears and in culture tubes inoculated from the affected eye. *November 12th.*—Eye perforated and allowed lens to escape this day. *November 13th.*—Baby died suddenly at 1.55 p.m. after a stay in Hospital of twenty-seven days.

From three days after the date of admission until November 11th the baby was kept in an incubator. **Weights.**—On admission, 4¼ lbs: October 20th, 4 lbs. 6 ozs.; October 26th, 4 lbs. 6 ozs.; November 2nd, 4¼ lbs.; and November 9th, 4½ lbs. **Temperature.** From admission to October 22nd, temperature very irregular, reaching at 6.30 a.m. on the 19th October 105° F. Onwards until death the temperature then was subnormal, except on one occasion when it was normal (98.4° F.), and on two other occasions, when it reached 98.6° F. It is to be noted that the temperature had been below the normal line for the six days immediately preceding death. **Respirations.**—They ranged from 24 to 48 per minute. **Pulse.** 100 to 160 per minute. **Stools.**—The motions varied from 2 to 7 a day after October 18th. On the day of admission and the following day there was no action of the bowels.

Report of post-mortem examination made on November 14th, 1904.—Nutrition poor. Weight 4 lbs. Rigor mortis absent. Hypostasis slight. Body deeply jaundiced. Keratomalacia of left eye (removed for subsequent examination). Mesenteric glands normal. Liver small, flaccid, very dark in colour. Gall bladder contains a small amount dark yellow bile, which can be forced into the duodenum. Spleen normal. Supra-renal bodies large and of dark colour. Kidneys normal.

Postscript to the above protocol:—"Sections of liver do not show any definite fibrosis. There are a few very small intercellular collections of small round cells. The smallest bile channels contain bile, but none is seen in the bile ducts in the portal canals. The liver is congested." A. N. LEATHEM.

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12. H—— ——, Violet, aged 8 months, attended my out-patient department at the Queen's Hospital for Children on March 16th, 1905.*

History.—The baby was born at term, and then appeared to be healthy. She has been fed upon cow's milk since birth. When aged two months, she began to fall away and to suffer from diarrhœa and vomiting. She attended the Hospital as an out-patient from September 15th to October 6th, 1904, and recovered under treatment with calomel, bismuth, and salol. Barley water was prescribed with the cow's milk.

About a month ago the baby again began to waste, and has continued to waste ever since. There has been diarrhœa (four to eight stools a day) but no vomiting. Five days ago (March 11th) the mother noticed "something white" over the baby's eyes, and for four days the baby has lain with her eyes covered by her hands, and has moaned without cessation. She is the first child.

On admission.—A miserable-looking baby, weighing (nude) 9 lbs. 8 ozs. It cries feebly and moans during the whole time it is being examined. There is no redness or swelling of the eyelids, which are kept constantly shut. Although there is no discharge of muco-pus, yet there is a slight running of water from between the palpebral fissures. The eyeballs manifest little redness. Both cornea are converted into greyish-white sloughs, except for a narrow peripheral portion, 1·5 mm. to 2 mm. wide. The limbus is slightly raised, and it forms, as it were, a narrow glistening band which encircles the gangrenous cornea. In addition to the limbal change, there is a small triangular area of dry and greasy-looking xerosis in the ocular conjunctiva on the outer side of each cornea. At the upper and inner part of the right cornea is a small black spot, representing a prolapse of the iris at an early stage.

13.—Ficken, Sarah, 8 months. Admitted Queen's Hospital for Children on March 10th, 1906, and died on March 28th, 1906.

Attended Dr. S. Neave's out-patients on March 10th, 1906, on account of cough, wasting, and conjunctivitis. Admitted to eye ward on same day. The baby had been fed upon Nestlé's milk since birth, and for the last two months Ridge's food had been given, in addition to the milk.

On admission.—A marasmic baby, weighing 9 lbs., T. 99° F. R.E.—Slight conjunctivitis with discharge. L.E.—Cornea hazy, with leucoma over lower part.

Treatment and Progress. *March 16th, 1906.*—"Nasty ulcer of left cornea. Pus in anterior chamber." *March 19th, 1906.* Ulcer larger, and cornea generally hazy. There is still pus in the anterior chamber. An anæsthetic was administered, and the ulcer cauterised with the galvano-cautery. *March 22nd, 1906* (baby seen for first time by me).—Base of ulcer is bulging forward, and appears as if about to perforate. The yellow appearance of the lower segment of the cornea has disappeared. Child improving. *March 26th, 1906.*—Child worse the last two days. Fontanelle and eyes sunken.

* Exhibited on March 17th, 1905, at a meeting of the Society for the Study of Disease in Children.

Motions loose, offensive, white, and pasty. Temperature, previously subnormal, has risen to-day to 99° F. Signs of consolidation of both bases behind. Condition of cornea much as before. *March 27th*, 1906. Child much worse. Consolidation of lungs extending. March 28th, 1906 Child died at 3.35 a.m.

Treatment included boric lotion, argyrol (25 per cent.), dionine (5 per cent.), perchloride lotion (1:0,000), and atropine (grs. 4). Baby fed on milk and lime water, and brandy administered. Internally, adrenaline, strychnine, mercury with chalk, and ipecacuanha were given.

Temperature. - The temperature showed a tendency to rise almost every day to between 100° F. and 101·8° F. and to sink to 97° F. or even a little lower. The elevation occurred sometimes in the morning and sometimes in the evening.

Bowels. The stools ranged from 1 to 5 *per diem*.

Weight. Successive weights were : 9 lbs., 9¼ lbs., and 9⅝ lbs.

Post-mortem Examination.

External appearance.—Wasted but not extremely thin baby.

Pleuræ. Healthy except over consolidated areas of lungs, where there was a granular appearance

Lungs. Consolidation of both lower lobes from confluent broncho-pneumonia.

Bronchial Glands. —Not enlarged

Mesenteric Glands.—Slightly enlarged, but no evidence of tubercle.

Pericardium. Healthy.

Heart. – Nothing noteworthy.

Abdomen.—A curious mixing up of the large and small intestines presented itself. The greater part of the small intestines were situated in the upper half of the abdomen, but passing into the midst of this was a coil of large intestine. The greater part of the large intestine lay below and to the left The mixing up of the small and large intestines was due to the fact that all were enclosed in one mesentery and the folding of this mesentery had caused partial volvulus of a portion of the small intestine and large intestine, causing a certain amount of constriction. The attachment of the mesentery ran obliquely from the point of origin of left renal vein to the left sacro-iliac joint. The great omentum came off the lower border of the stomach and passed downwards to transverse colon and ascending colon. On the left it formed part of the covering of the spleen and a fold below it resembling the spleno-colic ligament.

Spleen. – Nothing noteworthy.

Stomach. – Ditto.

Small intestine.—Ditto.

Large intestine.—Constricted about juncture of ascending and transverse colon, where partial twisting had occurred.

Pathological Examination of Eyeball.

The left eyeball was hardened in formol (5%), frozen, and cut into three portions by meridianal incisions. The upper and the lower parts were rejected, and the middle part was divided into an anterior and a posterior segment. After the usual preparations, these were embedded in celloidin, and cut for the microscope.

1.—**The anterior segment.**—Over most of the lower half of the cornea, Bowman's membrane and the anterior epithelium were missing, or, at the most, traces of the first-named could be recognised here and there. This portion of the cornea was ulcerated, and its substantia propria contained masses of small round inflammatory cells. The remainder of the cornea showed œdema and a restricted number of inflammatory cells. Some inflammatory cellular effusion was present towards the angles of the anterior chamber. The iris contained dilated vessels, and many small round inflammatory cells. Its uveal layer was adherent here and there to the anterior capsule of the crystalline lens (*posterior synechiæ*). The meshes of the suspensory ligament were crowded with inflammatory cells, apparently derived from the ciliary body, which manifested evidences of interstitial inflammation. Such cells were also found in the hyaloid membrane.

2.—**The posterior segment.**—General inflammatory changes.

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14. – Raven, Leonard, 11 months. Admitted Evelina Hospital August 8th, 1905, and discharged October 3rd, 1905.

History.– Admitted as an out-patient, under Dr. Whipham, on August 4th, 1905, suffering from diarrhœa and vomiting. Baby said to have been ailing for three weeks. Motions, of normal colour, three a day. Weight, 12 lbs 5 ozs. Corneal ulcer on one eye. The sixth child in family. Born at term. Breast until eight months, and then gravy, potatoes, milk puddings, barley water and milk. Biscuits, bread and butter, and eggs also given. At 10 months, diarrhœa with offensive motions, and wasting.

When the baby was first seen in the ophthalmic department on August 8th, 1905, the following notes were made :—

Five days ago, according to the mother's statement, a small speck was noticed on the left eye. No photophobia, lacrymation, or discharge is present ; baby seems to have no pain. L.E. : a white swelling is present over the lower part of the cornea, but does not quite reach the sclero-corneal junction. It seems to be solid, and to have increased in concentric rings. Its surface is shiny, and some fine vessels appear to be present under the surface. Pupil contracted. No hypopyon. Marked conjunctival congestion. Muco-purulent discharge.

A diagnosis of keratomalacia was made, and the child taken into the Hospital.

Upon admission. A markedly athrepsic infant, moaning feebly and manifesting a slough covering, roughly, the lower half of the left cornea. Signs of inflammation not well marked. No xerotic patches in either eye. Child examined generally with negative result White spots on palate and sides of mouth. The latter is red and sore. There are several sores on the buttocks.

Bacteriology. Blood-agar was inoculated with a scraping from the affected cornea. After incubation, the surface of the medium showed small, translucent, greyish colonies. Films stained from these showed a coccus occurring in pairs and small groups, probably the pneumococcus. The coccus was inoculated into a rabbit. The animal died in about thirty six hours, and its heart blood was found to be crowded with pneumococci.

Treatment and Progress.—Physostin sulphate, gr. 1. to the ounce, to the left eye every three hours. *August 14th.* Half an ounce of cod-liver oil to be rubbed into the skin twice a day, *August 15th.* Baby has lost one ounce since admission. L.E. entire cornea, except for a peripheral zone ½mm. to 1mm. in width, occupied by a bulging slough with protrusion of Descemet's membrane. No patches of xerosis R.E. unaffected. *August 22nd.*—A tiny perforation of the left cornea has occurred, and the tension of the eyeball is low. *September 1st.*—Mist. acidi co., two drachms thrice a day. *September 2nd.*—The child has gained weight, and her general condition has improved. Child now opens affected eye well and there is no congestion. The pupil is occluded by a bulging leucoma adherens, and the tension is raised. *October 3rd.* Child now bright and well, weighing 44½ lbs. Opens his left eye readily. No redness, discharge, or lacrymation. Tension not raised. The lower three-fourths of the cornea is occupied by an adherent leucoma, which entirely occludes the pupil. The central part of the corneal cicatrix is apparently thinned, and is of a darkish colour.

Weight.—Successive weights during the baby's stay in hospital were as under: (admission) 12 lbs. 5 ozs.; (August 15th) 12 lbs. 4 ozs.; (August 22nd) 12 lbs. 12 ozs.; (August 29th) 13 lbs.; (September 5th) 13 lbs. 2 ozs.; (September 12th) 13 lbs. 8 ozs.; (September 19th) 13 lbs. 12 ozs.; (September 26th) 14 lbs. 4 ozs.; (October 3rd) 14 lbs. 8 ozs.

Temperature.—On admission, 99·8° F. and on the following morning 100·4° F. Until August 30th it remained subnormal except on four occasions, the highest point touched being 98·8° F. From August 31st to September 4th the temperature oscillated between 96° F. and 100° F. It then fell to below the normal line, and remained there with insignificant variations until the date of the child's leaving the hospital.

Stools.—The motions varied in number from 1 to 7 a day.

Subsequent Notes made in the Out-patient Department.

November 28th, 1905—Weight 22½ lbs. A staphyloma is present involving almost the whole of the left cornea. Tension raised. The child appears to be in some pain with the eye.

15.—Caley, Leonard, 9 months. Admitted to the Queen's Hospital on July 30th, 1906, and discharged on December 21st, 1906. Admitted with keratomalacia (R.E.).

On Admission.—Broncho-pneumonia (double). Some retraction of head. Temperature, 100.2° F. Weight, 10½ lbs. R.E. An ulcer which occupies the greater part of the cornea has perforated, and the remainder of the cornea is hazy. Tension low. The ocular conjunctiva has lost its lustre, and has a greyish hue. L.E. The ocular conjunctiva as in right eye, but there is no ulceration of the cornea.

Progress and Treatment.—Milk, barley water, and cream. Brandy, m. XXX, every six hours. Physostigmine (gr. 1 to the ounce) to the eyes every six hours. Warm boric acid lotion often. Nasal feeding, as baby takes food badly. *August 2nd,* 1906.—Child is being fed by mouth to-day. Retraction of head still present. Tubular breathing can be heard in right axilla. Baby lies with properly closed eyelids, which although a little oedematous, are scarcely reddened. He resists examination of his eyes, the condition of which is as follows.—R.E. The greater part of the cornea is occupied by a slough of greyish yellow colour, only 2 mm. of the cornæ being left intact. The inner half of the slough shows a keratocele. L.E. Not inflamed. Xerosis conjunctiva still present. The lower third of the cornea shows slight dulness and loss of the epithelium. *August 9th,* 1906.—The upper lid of the right eye is now red and swollen, resembling the condition found in gonorrhœal ophthalmia. There is chemosis of the ocular conjunctiva. The cornea is clearer than it was, although there is still a slough at some parts of its margin. A darkish body, clearly the crystalline lens, can be seen, when baby struggles, through the valve-like opening that involves the outer periphery of the cornea. L.E.—no external signs of inflammation. A shallow ulcer involves the lower third of the cornea, the rest of which structure is clear. No white line at limbus. Brandy every four hours. Meat juice added to the diet. *August 12th,* 1906.—Taking food fairly well. Temperature 104.6 F. Tubular breathing heard all over right lung in front. Crepitations on left side and also at right base. *August 13th,* 1906. The right cornea has perforated, and allowed the lens to escape. The latter body was found on the pad when dressing the eye. The cornea now presents a more or less circular aperture, with a sharp edge at the point of perforation. *August 16th,* 1906.—R.E. Child is very ill. R.E.—Symptoms are subsiding, and the central parts of the cornea through which lens escaped three days ago are covered by a slough. L.E. A definite ulceration, some 1.5mm. in diameter, lies below the centre of the cornea. Eyeball is somewhat red. *August 28th,* 1906. R.E. swelling and redness of eyelids and protrusion of globe, which is in a condition of panophthalmitis, L.E.—Signs of inflammation not pronounced, although there is a keratocele towards the centre of the lower third of the cornea. *September 5th.* 1906.—Retraction of head still present, and baby's general condition not so good. Although he is taking well, he has lost 1¾ lbs. during the last fortnight. Scattered over both lungs rhonchi and tubular breathing can be heard. Otorrhœa right side and enlarged preauricular land. *October 3rd,* 1906.—Condition of child varies considerably from day to

day. Head retraction not constant. Despite the fact that he takes his food well, is losing flesh. R.E. —The shrunken globe now appears as a small yellowish body, of very low tension, with a dark coloured central portion. L.E.—The keratocele towards the lower third of the cornea is still present. *October 10th*, 1906.—Head more retracted. Child, who is restless, screams occasionally. The baby has gained ¾ lb. in weight. *October 29th*, 1906. Patient, whose general condition is really bettered, has gained one pound in weight since the 10th instant. Condition of eyes unchanged. *November 8th*, 1906.—R.E. a shrunken stump. L.E.—The leucoma adherens which is present entirely occludes the pupil. Tension normal. Nurse thinks child cannot see with left eye. As regards himself, the child is doing moderately well. *November 15th*, 1906. Iridectomy attempted on left eye. *November 28th*, 1906. Condition of child greatly improved.

Successive weights were 10½lbs.; 10⅞lbs.; 11lbs.; 10¼lbs.; 11lbs.; 11lbs.; 11¼lbs.; 10½lbs.; 10lbs.; 10lbs.; 10lbs.; 10½lbs.; 10¾lbs.; 10⅝lbs.; 11lbs.; 11¾lbs.; 11lbs.; 11¼lbs.; 11½lbs.; 11¾lbs.; 12lbs.; 12¼lbs.; 12⅝lbs; 12¼lbs.; 13lbs.; (on discharge) 13lbs.

Bacteriological report.—On August 2nd, 1906, smears and cultures were made from scrapings obtained from the right cornea. In smears a rod-shaped bacillus, Gram-positive, not acid-fast, was present. It had about the size of the Klebs-Löffler organism, but did not show polar staining. After twenty-four hours at 37° C. a pure culture of the same organism was found in the serum tubes. There was no growth on the agar tubes at the end of thirty-six hours. The bacillus did not give an acid reaction in neutral bouillon. It was identified as the xerosis bacillus.

16.—Saunders, Charles, aged 14 months. Admitted Queen's Hospital on October 4th, 1906, and discharged January 30th, 1907.

History. Before this neglected-looking infant had chicken-pox at eleven months he was in good general health and had nothing wrong with his eyes. There has been no vomiting, but he has suffered from diarrhœa for one month.

On Admission.—Weight 12¾ lbs. Neglected sores on occiput. R.E., lids somewhat red and swollen. What appears to be an incomplete congenital coloboma is present towards the free edge of the middle of the upper eyelid. The ocular conjunctiva is reddened. The central region of the cornea is converted into a slough, and is protruberant. L.E., unaffected.

Progress and Treatment.—Milk diet with cream. Brandy, 30 drops every four hours. Cod liver oil and malt. Inunctions of cod liver oil. Boric fomentations and physostigmine drops (gr. 1) every four hours. *October 7th*, 1906.—Child now taking its food well. The right cornea is much cleaner, and there is less discharge from the eye. *October 11th*, 1906.—Child better in every way. The right cornea has not perforated, although the greater part of it is now represented by a keratocele. Medium symptoms of inflammation. No physical signs found in chest or abdomen. *October 16th*, 1906. The patient has some bronchitis. *October 29th*, 1906.—Child has gained nearly one pound since admission to hospital. The bronchitis is better, and he takes food well. Hydrogen peroxide to eye *ter die*. *November 1st*, 1906. The right cornea is in a condition of keratectasia. *December 28th*, 1906. General condition of child satisfactory. Child opens his right eye, of which there is no redness. Coloboma of lid, of course, present.

Successive weights were—(admission) 12½ lbs.; 12⅞ lbs.; 13 lbs.; 13¼ lbs.; 13½ lbs.; 13⅝ lbs.; 14 lbs.; 14½ lbs.; 14¾ lbs.; 15¼ lbs.; 15⅞ lbs.; 16¼ lbs.; and on discharge 16⅞ lbs.

17.—Thomas, Estelia, 7 months. Admitted to Queen's Hospital for Children on June 7th, 1906, and discharged September 3rd, 1906.

Estella is the seventh child. She was healthy until six weeks ago, when she was put upon the bottle. Since then "she has fallen away." There has been neither diarrhœa nor vomiting

About three weeks ago both upper lids began to swell, and a fortnight ago, a whitish appearance of both eyes was noticed.

Two of the children of the family have died from diarrhœa and vomiting.

On admission. Eyes examined under chloroform; R.E., no redness of eye. A creamy patch of xerosis lies in the ocular conjunctiva below and to the outer side of the cornea. A small area having a similar appearance lies just below the centre of the cornea L.E., slight redness of eyeball. An ulcer, which is on the point of perforating, lies over the centre of the cornea. There is a *plaque* of epithelial xerosis in the ocular conjunctiva on the outer aspect of the cornea.

Although the child is very feeble, there are no definite physical signs in chest or abdomen. Weight, 10½ lbs. Temperature, 97 F.

Progress and Treatment. Baby placed upon milk, lime water and cream. Raw meat juice also given. Brandy, m.Xv, every four hours. Locally, quinine lotion (grs. 4 to the ounce) kept applied on pads to the eyes, and physostigmine (grs. 2 to the ounce) dropped into the eyes every four hours. *June 14th*, 1906. The left cornea has perforated. Inunctions of neat's-foot oil. Weight 10¾ lbs. *June 20th*, 1906. Fine crepitations heard all over chest, most marked over right lower lobe. No enlarged glands can be felt in abdomen, neither can the liver nor spleen be palpated. Weight 10⅞ lbs. *July 26th*, 1906. The child, who now weighs 10½ lbs., seems better in herself. She rolls her eyes about aimlessly, and is evidently blind. R.E., the pupil is occluded by an adherent leucoma, which covers the central parts of the cornea. L.E., the orbit is occupied by a shrunken stump *August 2nd*, 1906.—Harsh breathing over both lungs, but most marked over upper lobes. The apex of the right upper lobe is dull and breathing over this area is of a somewhat tubular character, especially behind. Some enlarged glands can be felt in the right iliac fossa. The child, believed by the nurse

in charge of the ward to be quite blind, is taking her food well, and has improved in general health. Weight 10½ lbs. *August 16th*, 1906.—Breath sounds rather harsh all over lungs, together with an occasional rhonchus. A few slightly enlarged glands in the neck. Weight 11 lbs.

18.—The patient, a male, Francis Jones, aged seven weeks, was admitted on Oct. 11th, 1906, and died on the 22nd.

He was the youngest of eight children, of whom four survived; there have been two miscarriages in addition. The infant, who was born at term, remained well until he was five weeks old, when he began to waste, "snuffled," and developed a rash upon the face and buttocks.

On admission. He was found to be a miserable-looking, "snuffling" infant, and weighed (nude) 8½ lbs. There were extensive copper-coloured rashes and superficial ulcerations on the buttocks, thighs, face, and angles of the mouth. The right eye showed merely a slight inflammation of the conjunctiva, such as is not infrequently present in syphilitic babies during the eruptive stage. The left cornea, however, was covered with an ash-grey slough, through the lower part of which a protrusion of Descemet's membrane (keratocele) could be recognised. On Oct. 18th the right cornea was affected, and it was noted as an unusual feature of the case that dry, white patches of xerosis, were present upon the conjunctiva of both upper and lower lids. The baby, who had the hoarse and raucous cry characteristic of a syphilitic infant, was extremely ill, although the skin eruptions were fading and the cutaneous ulcerations were healing. On the 19th the right cornea looked as if it had been cauterised with silver nitrate—it was of ashen hue, with an irregular and gibbous surface. The child died on the 22nd. No autopsy.

Treponemata were found in scrapings from both the corneæ, taken on several different occasions.

19.—William Chandler, aged nine months, was admitted on Feb. 7th, 1907, and was discharged on April 5th.

The left eye was stated to have been bad for one month. The signs of congenital syphilis included frontal bosses, "snuffles," depressed bridge of nose, and a subcutaneous gumma of one thigh. A sloughy and unhealthy-looking ulcer of large size occupied the central parts of the left cornea, but no marked reaction, such as redness or watering of the eye, was present. The child opens the eye well. He weighed 10½ pounds. On Feb. 14th the notes stated that towards the centre of the lower third of the left cornea was a small ulceration, through which Descemet's membrane protruded when the baby cried. Symptoms of inflammation were not at all pronounced. The child has improved in general health. On the 21st the child's general condition was better and the corneal ulcer was healing. On March 14th the left cornea showed a leucoma, to which the iris was adherent, in its lower third, and a small anterior pyramidal cataract was likewise present. The child was discharged on April 5th, and he then weighed 11¾ pounds.

On Feb. 13th, under chloroform, scrapings were taken from the left cornea and were handed over to Dr. W. A. Milligan, pathologist to the Hospital, for examination. Dr. Milligan reported: "Film stained by Giemsa. There are to be seen delicate screw-like rods resembling the spirochæta pallida." The observation was repeated on the 21st. Similar results were obtained independently by myself.

20.—This patient was an infant, aged three months, in whom the syphilitic manifestations included athrepsia, coryza, slight enlargement of the spleen and liver, and a few small ulcerated papules about the anus. The corneæ were practically destroyed and the eyes were in a condition of incipient panophthalmitis when the baby was seen by me. The treponema pallidum was found in scrapings from the diseased corneæ. A microscopical field could seldom be examined without coming across one or more of the micro-organisms.

21.—Joseph Wood, aged 3 months, was admitted on July 11th, 1907, and died on the 28th.

The **family history** showed that three children were born dead, one at seven, one at eight, and one at nine months. The fourth baby, a girl, wasted from the first, and both eyes were affected, probably with ophthalmia neonatorum, on the fourth day. She died when four months old.

The **personal history** of the patient was as follows:—He was born "a fine baby," but had wasted since he was three weeks old. He had been subject to vomiting after his bottle for the previous three weeks. There had been no diarrhœa. It had been noticed by the mother that the boy's eyes had been inflamed for five days and that for two days "a white film" had formed over the left eye.

When admitted the child was wasted, cried continually, and "snuffled" loudly. His weight was 7½ pounds and his temperature was 97·6° F. There were ulcerated condylomata around the anus. The umbilicus showed a dry, ulcerated surface overlying a thickened mass, probably a gumma. The spleen and liver were palpable. The infant was jaundiced. There was a sanious watery discharge from both eyes, especially from the right. An examination under chloroform showed that the corneæ were surrounded by a glistening ring of xerosis, slightly wider at the inner and outer side than elsewhere. Again, the ocular conjunctiva was of characteristic silvery appearance, was dry, wrinkled, and could be readily pinched up. The right cornea was tolerably clear except for a purulent infiltration in its upper-inner quadrant. A large part of the left cornea was occupied by a purulent focus, made up of two divisions—a larger one below and to the inner side, and a smaller one to the outer side at a somewhat higher level. None of the cornea was clear. There was no swelling of the lids or other evidence of inflammatory reaction.

On July 18th the right cornea was occupied by a greyish-yellow slough and there was a bulging dark spot in the lower-outer quadrant representing a keratocele. The left cornea was in a similar but even more desperate condition. Evidences of inflammatory reaction were conspicuous by their absence. The navel had healed. The general condition of the child had not improved. He weighed 7¼ lbs. On the 26th the baby had developed a well-marked papular eruption of a dull-red colour over the body and limbs. The papules averaged one-eight of an inch in diameter. He took food badly, "snuffled" and was getting weaker. He died from exhaustion on the 28th. No necropsy was held.

On July 12th Dr. Milligan reported staphylococcus pyogenes albus in a tube of agar-agar smeared with secretion from one cornea. On the 14th an examination of smears for the spirochæta pallida reported negative. On the 25th, however, staphylococcus albus on agar-agar and spiroch etæ were found in smears treated by the Giemsa plan.

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22. Mapham, Frederick, 9 months. Admitted Kensington General Hospital on May 14th, 1907, and died May 24th, 1907.

History.—The child was suddenly taken ill on May 14th with blueness, fixation of the eyes and (?) convulsions. He then vomited several times. He was brought to the Hospital, where he was admitted under Dr. George Herschell.

On Admission.—A thin child, rather collapsed. T. 103° F. P. 160. Breathing rapid. A diagnosis of broncho-pneumonia at the left base was made.

Progress and treatment.—*May 16th*, 1907.—Discharge from eyes, ears and nose. *May 17th*, 1907.—Broncho-pneumonia right apex behind and also right base. *May 18th*, 1907. Child examined for the first time by me. There was a good deal of muco-purulent discharge from the eyes, but no ulceration of the cornea. *May 22nd*, 1907.—The general condition of the child is serious. The eyelids are kept properly closed. Both corneæ have perforated, and the iris has prolapsed. In the right eye the perforation is in the lower third of the cornea, and in the left eye at the lower-inner quadrant. There is pus in the anterior chamber of the left eye. Signs of inflammatory reaction are slight. T. 103·8° F. P. 168. *May 23rd*, 1907.—T. (night) 106° F. Respirations, 76. Pulse scarcely countable. *May 24th*, 1907.—Since the 22nd the child has been more or less unconscious, with semi-closed eyelids, but it is to be noted that prior to the date mentioned the lids were kept closed. T. 107° F. Child died at 4 o'clock p.m.

Bacteriological report.—On May 23rd, 1907 that is, the day before death—agar-agar and blood-serum tubes were inoculated from the material which covered the ulcer of the left cornea. The greater part of the growth on agar-agar was composed of staphylococcus albus and aureus. But intimately mixed with these in small number was a small and short bacillus, which resembled Hoffmann's bacillus, but which it was impossible to obtain in pure culture. On the blood-serum the proportions of the various colonies were different from those on the agar-agar, but the component micro-organisms were the same.

Post-mortem examination (made on May 25th, 1907).—The left pleura contained slightly blood-stained effusion and flaky lymph. Broncho-pneumonia at the left base. Exudation almost purulent. No breaking down. Small patches of broncho-pneumonia dotted through rest of lung. Right base earlier broncho-pneumonia. Small abscess about an eighth inch in diameter, in middle lobe. No caseation of bronchial glands. No evidence of meningitis. Abdominal viscera normal. Some milkiness in arachnoid around optic chiasma.

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23. Boyd, Elizabeth. 5 weeks. Admitted to Queen's Hospital for Children on June 3rd, 1907. Died June 5th, 1907.

Admitted on account of keratomalacia of the right eye.

Present condition. Weight, 5½lbs. Temperature, 96° F. The left cornea is opaque and grey, but symptoms of inflammation, as redness, almost absent. The affected eyeball looked shrunken.

History.—The eye has been noticed to be bad for a week. Four other children (three stillborn). Patient affected with extreme marasmus.

Treatment.—Physostigmine, grs. 2, three times a day. Boric cleansings. Mercury ointment, half a drachm, for inunction once a day. On the day of death (June 5th) 10 drops of brandy every two hours prescribed.

Post-mortem examination.—Pneumonic consolidation of lower lobe left lung and of lower and middle lobes of right lung. Kidneys very pale. Other organs normal. No evidence either of tubercle or of syphilis.

24.—Grizzle, Florence E., aged 9 months. Admitted to the Evelina Hospital on July 7th, 1908, and discharged on July 21st, 1908.

History.—No family history of phthisis pulmonalis. The eyes stated to have been bad and to have "stuck in the morning" during the last ten days.

On admission.—This miserable wasted infant weighs 8 lbs. 14 ozs. Her temperature is 100° F. There are a few sores about her anus, together with evidences of a recent papular eruption, but the manifestations are not definitely syphilitic in type. The breath-sounds are rather faint at the base of the left lung, where tubular breathing can be heard. There is a discharge from both ears.

Eyes.—Externally, no marked signs of anything like serious inflammation of the deeper parts of the eye. The right cornea, however, is replaced by a greyish-white slough, through the upper temporal quadrant of which peeps a small protrusion of Descemet's membrane (keratocele). No xerosis conjunctivæ. No particular redness of eyeball. The left cornea is represented by a yellowish-white slough. Two dark-hued keratoceles are present—one at the inner and the other at the outer end of the horizontal meridian of the cornea. No xerosis of the conjunctiva.

Treatment and Progress.—Child fed on milk and barley water (equal parts). Ten drops of brandy were given every four hours. Physostigmine sulphate drops (gr. 1 to the ounce) applied to each eye three times a day. The eyes were kept clean with hot saline lotion (1·4 per cent.).

July 10th, 1908.—Left eyeball not reddened, and cornea much as noted. *July 14th*, 1908.—Weight, 8 lbs. 8 ozs. General condition worse. As regards eyes, reactional signs but slight. The lower third of the right cornea is sloughy, while its upper two-thirds are protuberant. There is keratectasia of the left cornea, especially affecting the upper and lower part of the latter. *July 21st*, 1908.—Has improved in general condition since last note, and child now weighs 8 lbs. 11 ozs. Discharged.

Child seen as an out-patient on *August 8th*, 1908, and found to be decidedly better in her general health. She had four teeth. There was globular keratectasia of the right cornea, while the left eyeball was shrunken.

Bacteriological examination.—On admission, scrapings were taken from the left cornea (which was in a pultaceous state) and smeared upon the surface of several cover-slips which were then stained with methylene blue and with Gram and eosin. Numerous micro-organisms were present. There were cocci, diplococci, and short chains in the various specimens examined. Clearly, most of them were pneumococci, as shown by the lanceolate shape of the diplococci, the well-marked capsulation, and by the fact that they stained deeply with Gram. On agar and blood-serum a coccus was isolated, which appeared to be the pneumococcus, and after a longer stay in the incubator, aspergillus fumigatus developed. At a later period cultures were made from the right eye, and on this occasion the xerosis bacillus, along with a coccus, was obtained. The coccus was a streptobacillus growing in short chains, and Gram-positive. Broth is rendered turbid in twenty-four hours. Litmus milk is turned acid and firmly coagulated in forty-eight hours. On agar there is a much greater tendency for the colonies to become confluent than is seen in streptococcus longus. The cocci grow well on gelatine at a temperature of 20° C., without producing any liquifaction of the medium. Glucose salicin and lactose were fermented, with the production of acid but not of gas. Mannite was unchanged.

25.—Turner, Caroline, 1 year and 8 months. Admitted to Queen's Hospital on September 10th, 1908, and discharged October 14th, 1908.

Admitted for xerosis conjunctivæ and potential keratomalacia.

Family history.—Four other children all well. The mother suffers from "bronchitis" and is very short of breath, and her voice is hoarse. No specific history could be elicited.

Personal history.—Bronchitis when aged one year. The child has been ill for one week—will not take her food, is always crying, is wasting, and her bowels are irregular. The eyes have been noticed to discharge for one week.

On admission.—A flabby, wasted child, with wrinkled and inelastic skin. Complexion sallow and muddy. General condition apathetic; does not resent examination or interference in any way. Eyes sunken. The still open anterior fontanelle is depressed. Head bossy, square, and very large. Forehead overhangs face. Moist sounds at bases of both lungs. Edges of eyelids sore, especially at the outer canthi, where the scaly condition characteristic of diplobacillary infection is present. No marked redness of eyes, photophobia, or lacrymation. Ocular conjunctiva all round corneal margin and over a triangular area on either side of the cornea in both eyes is sticky, wrinkled, and devoid of its normal glistening appearance. Both corneæ are dull, especially in the lower part of the outer quadrants. The opacity is slight and apparently superficial, and due to changes in the epithelium. When fluorescein is dropped into the eyes, the nasal side of the right cornea stains readily, while there is only a slight diffuse hazy staining over the centre and lower half of the left cornea. There is a slight sticky discharge in both conjunctival sacs.

Progress.—*September 26th*, 1908.—Child very much better. She is much more lively. Both corneæ are clear, and the conjunctiva is now practically free from xerotic changes. *October 14th*, 1908.—Conjunctivæ and corneæ now free from morbid changes.

Successive weights were 14½ lbs., 15 lbs. 15½ lbs., 28 lbs.

Bacteriological Examination. Diplobacilli (Morax-Axenfeld) in smears from conjunctival sac and in cultures on blood-agar.

26.—Keredon, Bertha, eight months. First attendance as an out-patient at the Queen's Hospital for Children, September 23rd, 1909. Admitted to Hospital on October 7th, 1909, and discharged on January 25th, 1910.

When seen in the out-patient department this child appeared to be suffering from acute infective conjunctivitis of the Koch-Weeks' type, and very slight dulness of the left cornea. The cause of the dulness of the cornea was not apparent to me Ordinary treatment was prescribed.

The history of the case was that the baby had suffered from whooping cough 3½ months ago and from measles 3 weeks ago. The whooping cough was followed by bronchitis which lasted for about a month. The child's eye was said to have become bad after the whooping-cough and bronchitis, and to have got worse since the measles. Patient is the youngest of eight children.

Patient again attended out-patient department on September 30th, but no note was made by the R.M.O. who saw the case.

On *October 7th*, she again attended, and I examined the condition myself. The left cornea was then sloughing and presented a keratocele towards its centre. The condition of the eye was most serious. The child was accordingly admitted to Mary Ward. She was in an extremely septic state, and her vitality was very low.

October 14th, 1909.—Left cornea has perforated towards the inner end of the horizontal meridian and a flesh-coloured granuloma, which probably arises from the iris, plugs the perforation in the cornea. The right eye shows less discharge. Case has been treated with physostigmine.

October 21st, 1909.—General condition of child better than a week ago. Less conjunctival injection. Prolapse of iris not increased in size.

October 25th, 1909.—State of left cornea, as well as general condition of child, continues to improve.

October 28th, 1909.—Left cornea the seat of a leucoma adherens. No clear and unaffected tissue.

Bacteriology. In scrapings from cornea were found : (1) pneumococci ; and (2) m. catarrhalis.

Treatment.—Hot saline often, physostigmine (grs. 2) t.d. Eye bandaged. Brandy, 10 m., every four hours.

February 10th, 1910 (seen as an out-patient). The left cornea is staphylomatous. The eyeball is of a dusky-red colour. Tension low.

27.—Langley, Ellen, 10 months. Admitted Queen's Hospital for Children on September 28th, 1909, and died October 8th, 1909. O.P. number, 3784.

This was a case of "zymotic diarrhœa," the temperature being a good deal raised practically during the whole time she was in Hospital.

The child was under the care of my colleague, Dr. Sheffield Neave, and on her first attendance as an out-patient the following notes were made under date September 21st, 1909 :—

"Diarrhœa 4 days. Retches, but brings nothing up. Breast-fed every 2 hours. Bowels open every time has breast. Green, watery, and offensive motions. Prolapse. Skin inelastic. No teeth. Fontanelle very patent. Eyes sunken."

When attending the Hospital as an out-patient, the left eye became affected, then she was admitted to the ophthalmic ward on September 28th, 1909.

On admission.—A wasted child. The left eye shows a sloughing ulcer, which involves, roughly, the lower third of the cornea.

Death on October 8th, 1909. No autopsy.

28.—Knell, Alfred, 6 months. Admitted to the Evelina Hospital under Dr. T. R. C. Whipham on September 2nd, 1909.

Family history. Eleven children in family, six of whom are dead, one from "wasting." One miscarriage at the third month.

Personal history. Full time after normal labour. Breast-fed. No other ailments. Diarrhœa for a fortnight, and getting thinner since then. Mother says child has had considerable abdominal pain. Sleeps badly, and cries a great deal.

On admission.—A fairly nourished child. Eyes not sunken, and expression almost animated. Skin inelastic. Lies comfortably in bed, but keeps legs drawn up. Cries when abdomen is touched. No physical signs of disease in chest. Spleen enlarged.

Treatment and progress.—*October 15th*, 1909. A week ago two large red swellings appeared on the scalp. These soon burst and discharged a considerable amount of pus. Bare bone was seen at the bottom of the cavities. The temperature rose with the abscesses, but gradually fell when they evacuated themselves.

October 19th, 1909.—Something amiss noticed with the right eye.

October 23rd, 1909.—Patient examined by me for the first time. No redness or swelling of the lids R.E.—no redness or blepharospasm. The centre of the cornea is occupied by a keratocele, to which the iris is not adherent. Rest of cornea shows no obvious changes. Child very placid, resenting but little attempts to examine the eye. General condition of child miserable. An atypical case of keratomalacia. Physostigmine sulphate, gr. 1, t.d. Bandage. Eye to be kept clean with saline, 1·4 per cent.

Bacteriological Report.—Scrapings from keratocele, or rather from the small slough which was attached to its anterior surface, smeared on cover-glasses and inoculated into agar (old and more or less dry). In the smears organisms that appeared to be pneumococci. On the agar, sarcinæ and s.p. albus (Leathem).

November 2nd, 1909.—Both the general and the ocular condition considerably bettered. R.E.—No redness. Opens eye freely. Keratocele is now replaced by a shield-shaped leucoma, to which the iris is non-adherent, which covers practically the entire pupillary area of the cornea. L.E.—has never been affected.

Remarks.—Baby believed to be syphilitic on account of family history and abscesses in scalp. He also suffered from diarrhœa and vomiting, and when eye got involved, was a pretty miserable specimen. Eye improved along with general health. Diagnosis on admission—"wasting." Mercury with chalk, gr. 1, t.d., commenced on September 12th, and increased to grs. 3, t.d. on the 15th.

29.—Barton, Gladys, 11 months. Admitted July 13th, 1909, and discharged October 11th, 1909.

History.—Both eyes have been "discharging" for about three weeks. They have been red and slightly swollen for a few days. On the 12th instant the mother observed a curious black speck in the left eye, and on that account took the baby to Moorfields. The child was referred to the Queen's Hospital from Moorfields as supposed to be suffering from diarrhœa and vomiting.

On admission.—Slight discharge from both eyes. Slight photophobia. No redness. There is a perforation in the lower-inner quadrant of the left cornea, with prolapse of the iris through the aperture. The remainder of the cornea is clear.

Progress and Treatment.—*July 17th*, 1909.—A gutter-shaped ulcer has suddenly appeared in the lower half of the right cornea. It is of some considerable depth, but is not infiltrated. There is no redness of the eye. The rest of the cornea is slightly hazy. *July 18th*, 1910.—Now some redness of both eyes. The ocular conjunctiva lies in folds. The gutter-shaped ulcer is spreading along the lower fourth of the right cornea, and is associated with a yellowish flaky deposit of pus in the anterior chamber. *July 22nd*, 1909.—R.E. The condition bears a closer resemblance to ulcus serpens in the adult than anything I have ever seen in a child before. Thus, the lower fourth of the cornea is occupied by a trench-like ulcer, of which the lower edge is rounded off, while the upper one is overhung with epithelium and is purulent. The remainder of the cornea is slightly hazy, probably from chemotaxis. L.E.—A leucoma adherens is present in the lower part of the cornea. The aggressive edge of the ulcer of the right cornea was treated with the galvano-cautery. *July 24th*, 1909.—The ulcer of the right cornea has perforated towards its outer end, and the iris has prolapsed into the aperture. Hypopyon has disappeared. Pupil drawn towards perforation. Rest of cornea clear. There is still some inflammatory redness and ciliary injection. *July 26th*, 1909.—Protrusion of iris greater in the right than in the left eye. Child very constipated. Her urine is thick, offensive, and contains pus. *July 31st*, 1909.—Child much better. Bowels open, and urine almost clear and not so offensive. The eyes show no redness. Each cornea is now clear and exhibits only a semi-transparent adherent leucoma in the positions already mentioned.

An iridectomy was performed upon each eye in August and September, 1909, and the child was discharged, apparently seeing well, on October 11th, 1909.

The treatment included argyrol (15 per cent), physostigmine (gr. 1 to the ounce), iodoform, oxycyanide lotion (1 : 5000), and saline lotion (1.4 per cent).

Bacteriological examination.—On July 22nd, 1909, material taken from beneath the ledge of epithelium in the right cornea, was smeared upon the surface of several cover-glasses. These, when stained, showed many tiny cocci and diplococci, some of which were capsulated. The micro-organisms were Gram-positive. It was almost certainly the diplococcus lanceolatus (pneumococcus). No culture, however, was obtained upon agar-agar or blood-serum.

30.—Shackleton, Beatrice, six weeks. Admitted to the Queen's Hospital on August 15th, 1910.

History.—The fourth child, born at term after a natural labour in Queen Charlotte's Hospital, London, on July 7th, 1910. No miscarriages. Weight, 6 lbs. 3¾ ozs. At birth no discharge was noticed from the baby's eyes, but the left eye began to discharge on the eighth and the right eye on the twenty-second day after birth. The symptoms of inflammation were not marked, and gonococci could not be found in secretion from the eyes. There was a return of conjunctivitis, of a very trivial nature, and on August 12th, when I first examined the patient, the right cornea showed a trench-like ulcer in its lower third. There was a little muco-purulent discharge from the eyes, but symptoms of actual inflammation on the part of the conjunctiva were almost non-existent. At the same time micro-organisms that appeared to be gonococci were found in cover-slips smeared with conjunctival secretion (see bacteriological report). The aspect of the case, taken in conjunction with the withered appearance of the baby, was more suggestive of keratomalacia than of gonorrhœal ophthalmia with corneal complications.

Baby sent for admission to the Queen's Hospital for Children.

On Admission.—Weight, 7 lbs. 13 ozs. The trunk is well-covered, but the arms and legs, more especially the latter, are inclined to be wasted. Temperature 99·4° F. Baby takes food well and has a strong cry. Heart, lungs and abdomen normal. The eyelids are slightly red and swollen. There is discharge from the eyes. The conjunctiva is slightly reddened. Both corneæ are affected. The right cornea has perforated in its lower third, and the perforation is occupied by a small prolapse of the iris. A glistening ring of xerosis encircles the lower third of the limbus. The lower half of the left cornea is occupied by a large infiltrated ulcer.

Treatment and Progress.—Physostigmine and hot saline to eyes, together with disinfection twice a day with "perhydrol." *August 18th*, 1910.—The signs of conjunctivitis are not pronounced, and are certainly nothing like those present in an ordinary case of ophthalmia neonatorum (gonococcal). The lower third of the right cornea shows a large prolapse of the iris, which is surrounded by a zone of infiltrated cornea. The lower two-thirds of the left cornea is occupied by a septic ulcer, the floor of which is of unequal depth. Annular xerosis of right eye, as noted. *August 19th*, 1910.—Weight, 8lbs. 2ozs. *August 23rd*, 1910.—Discharge from eyes less. The right cornea much in same condition as already noted. The left cornea, however, shows signs of impending perforation. *August 24th*, 1910.—Prolapse of iris in left eye. *August, 25th*, 1910.—Eyes examined under chloroform. The right cornea shows a cicatrised perforation in its lower third to which iris is totally adherent. The left cornea has also perforated and is in process of healing. Hardly any symptoms of conjunctivitis are present. General condition has improved. Weight, 8lbs. 8ozs. No diarrhœa (stools 2 to 3 daily). No broncho-pneumonia. *September 1st*, 1910.—Baby in good condition, weighing 9 lbs. She opens her eyes, which present no obvious signs of inflammation. Both corneæ have now healed with the production of an adherent leucoma. The prolapsed iris noted as present in the right cornea on August 18th has levelled down. No xerosis.

Bacteriological Report.—1. *Specimens taken whilst baby was an inmate of Queen Charlotte's Hospital (from conjunctiva).*—Films show Gram-negative intra- and extra-cellular diplococci in fairly large numbers, resembling the gonococcus in shape and size. The stain with Pappenheim is characteristic of the same organism. On blood agar, cultures were obtained of a Gram-negative diplococcus. The cultures, which were pure, were those of a slowly-growing but typical gonococcus. 2. *Specimens taken direct from the cornea on August 15th, 1910, after admission to the Queen's*

Hospital. Report by Dr. A. W. G. Woodforde, pathologist to the Hospital.—Films show the same organism as that found at Queen Charlotte's Hospital, but in smaller numbers. On agar a few colonies were obtained of a large Gram-positive bacillus. On blood-agar, there were a few colonies of the same Gram-positive bacillus, and also of a Gram-negative diplococcus, showing numerous giant forms. The latter colonies were typical of gonococci. The Gram-negative diplococcus was transplanted on ordinary agar, where it grew feebly. A second subculture showed no growth at all.

31.—Carslake, Rose, 8 months. Attended Evelina Hospital for first time on November 2nd, 1909.

Diagnosis,—Keratomalacia (B.E.)

History.—Third child. Always bottle-fed. Lately, the mixture has consisted of equal parts of boiled milk and barley water.

Three weeks ago child was attacked by bronchitis, and was attended by a dispensary doctor. On October 26th last the baby's eyes were noticed to be bloodshot and to discharge yellow matter. Lotion was prescribed by the medical man in attendance upon the case. This morning (November 2nd) condition of eyes such that the child was sent straightway to the Hospital.

Present state.—The baby looks ill, moans feebly, and is somewhat wasted. The eyes can be half opened. The lids are perhaps a trifle reddened, and may be a little œdematous. There is a certain amount of muco-purulent discharge from the conjunctiva, which nevertheless is not markedly injected. R.E.—The cornea is surrounded by a slightly raised, narrow, white line of xerosis, but the ocular conjunctiva shows no such change. The lower third of the cornea is occupied by a purulent ulcer which has perforated, and allowed the iris to prolapse. L.E.—The lower-inner quadrant of the cornea is the seat of a purulent ulceration, and the adjacent parts of the limbus show a semi-circular line of xerosis, similar to that described as present in the case of the right eye.

The baby was sent to the Queen's Hospital for admission under my care. She remained in that institution from November 2nd, 1909, until January 31st, 1910.

Treatment and progress.—Upon admission, the child was placed upon a suitable milk diet, hot boric fomentations were applied to the lids, and physostigmine (grs. 2 to the ounce) was dropped into the eyes three times a day. Brandy was given. *November 3rd*, 1909.—No discharge from eyes. Slight photophobia. Eyelids very slightly swollen. Trivial injection of eyeballs. Situated along the inner and outer edge of each cornea is a thin, white, elevated line, like the crest of a wave. The right cornea is generally hazy, and a perforated purulent ulcer lies in the lower nasal quadrant of the cornea. As regards the left cornea, a shallow purulent ulcer, of kidney-bean shape, lies below the pupil in the lower nasal quadrant of the cornea. The eyes can be examined without any particular resistance on the part of the child, who is ill nourished and weakly. *November 7th*, 1909.—Xerosis is present of both eyes at the inner and outer side of each cornea. The right cornea is prominent, and the eye injected. The ulcer of the left eye is somewhat larger, and hypopyon is present. *November 10th*, 1909.—There is now marked congestion of each eyeball. The hypopyon noted as being present in the anterior chamber of the left eye is rather less profuse. *November 18th*, 1909.—R.E.—Five-sixths of the cornea is now covered with a greyish-yellow slough, probably in connection with the prolapsed iris. L.E.—Pupil well contracted by physostigmine. An extensive but shallow ulcer occupies the lower-inner quadrant of the cornea. Condition of baby grave. Since the 12th instant the temperature has ranged from 100° F. to 103° F., and has touched normal only on two occasions, although taken three times a day; there have been from four to nine stools a day; the respirations have varied from thirty to sixty, and the pulse from 120 to 172 per minute. *November 25th*, 1909.—The ulcer of the left cornea has practically healed. *December 16th*, 1909.—The baby is now well on the way to general recovery. She has gained five ounces during the last two weeks. The right eye is shrunken, a little clear cornea only remaining. The left eye shows an adherent leucoma in the lower nasal cornea of the cornea. No redness of eye. Baby opens eye of own accord, and is stated to recognize her bottle at a distance of about a yard. *January 13th*, 1910.—Under chloroform, iridectomy performed inwards upon the left eye, a considerable piece of the iris being got away. *January 25th*, 1910.—Left eye in excellent condition, and results of operation satisfactory.

Whilst in Hospital successive weights were:—10 lbs. 14 ozs., 10 lbs. 7 ozs., 10 lbs. 14 ozs., 10 lbs. 12 ozs. and 11 lbs. 14 ozs.

Result.—This child was seen in the out-patient department on February 3rd, 1910, when her condition was as under: weight, 200 ozs.; general condition, fair. R.E. shrunken. L.E. leucoma adherens, with good iridectomy coloboma up and in.

Bacteriological Report.—Cover-glasses smeared with material from the ulcerated cornea were submitted to the Hospital pathologist, who reported that gonococci and xerosis bacilli were present. Apparently, however, no cultures were made or attempted.

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CLINICAL MEMORANDA.

SPASMUS ROTANS?

BY

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C. R. was sent to me at the Newcastle Eye Infirmary, by my friend, Dr. T. L. Bunting, with a note drawing attention to the salient features of the case. There was an internal concomitant squint of the left eye, and an almost persistent lateral nystagmus which had not been noticed by the parents until Dr. Bunting pointed it out to them.

When the right eye was fixed, slight rotatory movements of the head were observed, but only under this condition. The hypermetropia present was +1D. The teeth were bad, but no other source of reflex irritation was discovered. The boy was four years old, and in good health. Both parents were healthy, and no hereditary taint was discovered.

At my suggestion, Dr. Bunting treated the boy with formic acid, and latterly has given him general tonics. Dr. Bunting now reports that he fancies the nystagmoid movements have been reduced since May, but that he cannot definitely assert any improvement.

What is this condition? I have ventured to give the name "Spasmus Rotans" to it on the analogy of Spasmus Nutans in which fixation of the head increases the nystagmus. One also knows that when one arm is tremulous, on its fixation, tremors sometimes appear in the other arm.

PULSATING CORNEA.

BY

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WHILE thinning of the cornea due to various conditions is not unusual, the presence of a definite and rythmic pulsation, distinctly evident on its surface, is of sufficiently rare occurrence to be worthy of note.

On December 4th, 1910, Mr. J. W. B ...., aged 29, presented himself with the following history.—Two years previously, while a student at Yale University, he had an acute attack of tonsillitis, after which his eyes, which had troubled him for eight years prior to that time, occasioned him so much discomfort—and his vision became so imperfect—that he was obliged to discontinue further studies. He is sure that before his twentieth year his vision was normal, up to which time he was an enthusiastic base-ball player.

Four years ago, he had a serious fall from a second story window striking on his feet, and seriously jarring his spine. No apparent organic disturbance, however, followed.

In 1904 he was examined by Dr. H. Gifford, of Omaha, who found a slight keratoconus. The test then made under homatropine showed :—

R.—6·50 D. sph. — 4·50 D. cyl. axis 135°
L.—1·50 D. sph. — 1·75 D. cyl. axis 150°

This differed so much from the test made without cycloplegia that he was given :—

R.—6·50 D. sph. — 4·50 D. cyl. axis 135°
L.—1·00 D. sph. — 1·50 D. cyl. axis 150°

Later, the right was changed for a plain glass. It was also noted that the axis of the right eye seemed unstable, varying from 150° to 165°.

It was evident that at that time the integrity of the cornea had begun to give way. On his visit to me in December, 1909, there was a sensation of great dryness in the eyes, with a strained feeling in close work. Vision was about 10/200 in each eye, and was not materially bettered by glasses.

In both eyes, the cornea was of a globular shape with an exceedingly deep anterior chamber, normal pupil, and no changes in the fundi, except those produced by the altered corneal curve, and giving the appearance of a circular shadow when the light was thrown in the line of the visual axis. The patient noted the peculiar symptom that a door or other rectangular shaped body seemed to spread at the top when he looked at it.

The high astigmatism of the right eye noted some years before had quite disappeared, and the ophthalmometer recorded 0·50 D. with the rule in each eye. When, however, the images of the mires were approximated, the upper edges were seen to diverge, and synchronously with each impulse of the heart and pulse, these images would separate to the extent of half a dioptre at the same time extending vertically, as might be expected from a curved reflecting surface which was being stretched.

Remarks.—Weeks mentions the fact that such pulsations are occasionally observed, but they are certainly rare. While it would be interesting to inquire whether the shock of the fall had in any way so disturbed the trophic nerves as to affect the corneal nutrition, and so deprive it of some element essential to maintain its structural resistance, the purpose of this note is merely to direct attention to the unusual clinical observation and to suggest that were it possible to detect it, a small pulsation of the cornea may be found to be a phenomenon which is normal to the human eye, and which occasionally becomes apparent when the tenuity of the cornea is reduced, as in this case of keratoconus.

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SOME PRACTICAL POINTS RELATING TO THE EHRLICH-HATA TREATMENT OF SYPHILIS.

BY

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Although this drug is becoming well-known to the profession, there are nevertheless many practical details which one can know only by actually using the specific one's self, and therefore no apology is needed for giving my own experience of its use.

The Ehrlich-Hata specific is usually designated by the consecutive number of the production "606," and consists of an oxydized diamid of arsenic, having the formula $C_{12}\ H_{12}\ O_2\ N_2\ As_2$. It consists of a yellow powder, which is sold in half gramme tubes sealed *in vacuo*.

In order to prevent subsequent pain, the drug must be injected under the strictest antiseptic conditions. A small agate pestle and mortar is necessary. This is first sterilized in boiling water, and a tube containing 0·5 grm. of the powder is emptied in. This is rubbed up with 10 cc. of distilled water into a mustard-looking thin emulsion and 0·3 cc. of caustic soda is added. The liquid is then tested with litmus and if still alkaline, drop by drop of acetic acid is added until it is *just neutral*. Ten cc. of the mixture is then drawn up

in a sterilized glass syringe, first heated by plunging into boiling water. A thick fold of the skin between the shoulder blades (previously sterilized by painting it with tincture of iodine) is now drawn up by the finger and thumb, and the needle of the syringe is inserted directly downwards between the cellular tissue over the muscles and the contents slowly pushed in. The entrance hole is then covered with a pad of lint and plaster, and the operation is complete.

It has been proved that injection into the veins is liable to produce severe fever and pain, since the arsenic compound is carried at once through the circulation, whereas if it is injected into the cellular tissue it is carried away very gradually—a week or more elapsing before the arsenic compound has vanished. Done in the way I have described, there is little or no pain and very little fever. It is, however, advisable to keep the patient in bed for about 3 days. In the three cases I have had to deal with there was no fever or pain at all and in two out of the three the healing process became evident to the naked eye within 24 hours after the injection. In one case (rupia), the crusts began to desquamate the next day. In the second case (secondary ulceration of the mucous membrane of the uvula and soft palate) the edges began to heal rapidly on the third day. In the third case the ulceration began to heal only at the end of a week.

A syphilitic child at the breast can be cured through its mother's milk, when the mother has been treated with the specific. Since, however, analysis has shown the milk to be entirely free from arsenic, it is clear that the healing action must be due to the antitoxins developed in the mother's blood.

I have made the most minute and exhaustive enquiries in the Berlin clinics where the drug is in daily use, but have as yet not heard of a single case in which optic neuritis, or indeed any ocular trouble, has resulted. Ehrlich attributes this to the fact that in "606" the arsenic is in an entirely different molecular combination than is the case with atoxyl, and that the former has no injurious effect on the nerve centres.

Although "606" can be employed in the later (tertiary) stages of syphilis, still even our limited experience has shown that the sooner after syphilis has been contracted the drug is injected, the speedier and more complete will be the cure.

Wassermann has pointed out that our conception of specificity must not be limited to the bacteria, but extended to every conceivable kind of animal and vegetable cell. The task of the future will be to find substances which have a characteristic action on certain groups of cells, just as certain germicides act more especially on certain groups or families of bacteria and are harmless to others. Hence, every organ and every tissue should have its special medicine, be it liquid, solid, or gaseous; so that the task of the future will be to find some chemical substance which will act on the liver, another on the brain centres, a third directly on the kidneys, and so on.

The application of "606," although at present largely confined to the cure of syphilitic lesions, appears to have more extended applications.

Professor Alt has already employed it with striking success in the severest forms of nervous diseases, *e.g.*, tabes and other paralytic affections, as well as affections of the brain centres. Professor Iveson, of St. Petersburg, has had excellent results in cases of malaria; while Dr. Lebermann (Berlin) has already employed it in many non-syphilitic skin lesions.

The drug will, it is stated, be obtainable by every physician at the commencement of the New Year. At present preparations are being made by the firm of Merck, near Frankfort, for its manufacture on a large scale, under the direct supervision of Professor Ehrlich himself.

A CASE OF WIDMARK'S CONJUNCTIVITIS.

BY

T. HARRISON BUTLER, M.D. OXON.

HON. OPHTHALMIC SURGEON TO THE COVENTRY AND WARWICKSHIRE AND TO THE WARNEFORD, LEAMINGTON AND SOUTH WARWICKSHIRE GENERAL HOSPITALS.

IN the *Mitteilung aus der Augenklink des Carolinischen Medico-Chirurgischen Instituts zu Stockholm* for 1910, the late Professor Widmark described a new form of conjunctivitis.*

The following case appears to be typical of the condition:

On August 5th I saw, in consultation, a married lady, aged 30 years, who was suffering from acute inflammation of both eyes. The history was that on August 2nd she began to have violent pains in the brows and at the back of the neck. This was much worse on the 3rd. On the 4th the eyes were noticed to be red. The inflammation increased and was accompanied by considerable photophobia.

When I first saw her, the appearances were exactly as described by Widmark. There was much injection of the conjunctiva of the lower lids and of the lower half of the conjunctiva oculi. On the lowest portion of the ocular conjunctiva, and bounded below by the palpebral fold, there was a kidney-shaped area, 12 mm. long and 4 mm. broad, which had a slightly greyish *matt* appearance. This area stained well with fluorescein. There was slight haze of the sector of the cornea bounded by eight and four o'clock. This did not stain with fluorescein. Both eyes were equally affected. The media were clear and the fundus was normal.

The refraction under homatropia was:—

R.V. = 6/60 $\frac{-0.15}{+1.5}$ axis vertical = 6/9.

L.V. = 6/60 $\frac{-1}{+5}$ axis vertical = 6/18.

The treatment suggested by Widmark was yellow ointment. This was ordered in 1 per cent. strength to be well massaged in three times a day. Under this treatment rapid improvement set in, and in a week the eyes were almost normal.

Remarks.—Widmark does not state that pain may precede the appearance of the injection. He also remarks that, in general, the disease is rather chronic. But all his cases ultimately recovered completely.

There was in my case no history of any irritant or foreign body having entered the eye, although the appearance suggested the action of a mild caustic.

It is possible that the disease is not very rare and has been overlooked. The oval patch which stains with fluorescein is the typical sign. In some cases there is slight haze of the lower sector of the cornea; in others the conjunctiva alone is affected.

* For abstract see p. 839 of the present number of THE OPHTHALMOSCOPE.

OPHTHALMIC INSTRUMENTS

MANUFACTURED BY

REINER and KEELER, Ltd.,

9, VERE STREET, CAVENDISH SQUARE, W.

(1) The Edridge-Green Colour Perception Lantern.

(2) Luminous Ophthalmoscope.

(3) Projection Lamp.

(4) The Ryland Schematic Eye.

The above instruments are briefly described below—further information or a demonstration will be gladly given.

(1) The Edridge-Green Colour Perception Lantern is now on trial in the British and United States Navies, the chief Shipping Companies, and in several British Railways. It enables tests to be made under conditions very closely allied to those found in every day practice, while the colours chosen are those which most rapidly and definitely disclose any defect in colour perception. It has been remodelled in order to allow the coloured lights to be seen direct, instead of reflected, as in the horizontal pattern. The composition and sequence of colours has not been changed, but the illuminating portion has been made detachable, so that the same lantern can now be used with electricity from the mains, from a battery, or with an oil lamp.

The lantern consists of four discs: three carrying seven coloured glasses, and one carrying seven modifying glasses. Each disc has a clear aperture. The other mechanical details are:—an electric or oil lamp with projecting accessories, a diaphragm for diminishing the size of the light projected, handles for moving the discs, and the indicator showing the colour or modifier in use. The diaphragm is graduated in respect to three apertures to represent a 5½ inch railway signal bullseye at 600, 800, and 1,000 yards respectively when the test is made at 20 feet. Three of the discs contain—Clear, Yellow, Pure Green, Standard Green, Blue, Purple, Red 1, Red 2; and one contains—Clear, Ground Glass, Ribbed Glass, Neutral 1, Neutral 2, Neutral 3, Neutral 4, Neutral 5. The colours are brought successively into view by moving one or more of the handles to position, denoting the colour or modifier in use, on the scale at the top of the lantern. The classification is as follows:—Heptachromic, Hexachromic, Pentachromic, Tetrachromic, Trichromic, Dichromic and totally

colour blind appreciating respectively in the spectrum—Red, Orange, Yellow, Green, Blue, Indigo, Violet—Red, Orange, Yellow, Green, Blue, Violet—Red, Yellow, Green, Blue, Violet—Red, Yellow, Green, Violet—Red, Green, Violet—Red, Violet—Light and Shade only.

A dichromic may vary with more or less grey patch between red and violet.

There are also, alone or in combination with the above, cases of colour blindness due to shortening of the red or violet end of the spectrum, or to the defective sensibility to rays of certain wave-length when the intensity is reduced or the retinal image is small.

(2) A new form of luminous ophthalmoscope is being developed, and will shortly be ready. It possesses several advantages over previous forms, among others being a larger field and better illumination.

(3) A new model Projection Lamp has been constructed on the principle of an optical lantern, the light from a special lamp passing through a condenser, and projected by an achromatic objective.

The result of this combination is that a circle of light equally bright from centre to periphery, is obtained whose diameter is $1\frac{1}{2}$ inches when the object illuminated is 12 inches from the lamp.

By the removal of a lens the same result may be obtained when the object is one metre from the lamp.

(4) The "Ryland" Schematic Eye, consists of a tube mounted on a substantial stand. One end of the tube is fitted with an iris diaphragm, while a cap screws on the other end. Various solid glass replicas of the human eye may be inserted in the tube with an artificial retina in contact. The dimensions of the solid glass replicas are those of the reduced human eye, while the radii of the cornea are those of the normal eye. This is even carried out for astigmatism; in this case the cornea has a toric form.

The instrument is capable of being used for the demonstration and practice of ophthalmoscopy, retinoscopy, ophthalmometry, and perimetry, while the changes of image definition during the course of an examination and for various pupillary diameters may be studied.

"Ophthalmic Instruments," a new publication dealing more fully with the above and other instruments, will be issued shortly.

LEAD STYLE IN NASAL DUCT FOR TEN YEARS; FAILURE TO REMOVE AFTER EXCISION OF THE SAC; ULTIMATE PRESENTATION OF THE STYLE AT THE INNER CANTHUS; REMOVAL.

BY

ERNEST THOMSON, M.D.,

SURGEON TO THE GLASGOW EYE INFIRMARY.

JANET B., aged 50, came to me at the Glasgow Eye Infirmary in September, 1908, stating that I had inserted a wire into her nose some years previously, and that she had lost trace of it. Lately there had been some irritation at the canthus, with discharge (which had long been absent) and she wished to know whether the instrument was still in the duct. On going over the case sheets, I found that in May, 1899, when assistant surgeon with Dr. Andrew Wilson, I had left the style in good position, with an elbow bend lying in the slit canaliculus. From that day until now the patient had not attended the Infirmary.

She was admitted as an in-patient, and the style was localised radiographically. It seemed to have become practically straight, and its upper extremity probably corresponded with the upper end of the duct. Under chloroform, I excised the sac, and proceeded to hunt for the style. After an hour's work with forceps and hooks, to the soft lead still defied removal, and there was nothing to do but to close the wound. I then asked the patient to see Dr. J. G. Connal as to the feasibility of removal *viâ* the nose. Dr. Connal was able to touch the lower end of the style, but could not grip it. He concluded that nothing short of a large operation on the bones of the face would suffice, and we decided to leave it alone

Five minutes later the upper end of the style presented, of its own accord, at the inner canthus, and by dint of combined dragging and swaying movements with a pair of sharp-toothed forceps, I managed to remove it. The amount of force required was such as to tear the lead wire asunder, so that it came away in two pieces.

By what mechanism this foreign body persistently stayed *down* the duct previous to excision of the sac, and proceeded to work *upwards* after that operation I cannot tell. Nor was it by any means loose in the duct as the difficulty of ultimate removal proved.

NOVELTIES.

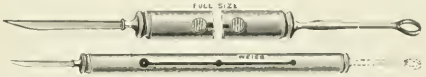
COMBINED TARSAL CYST KNIFE AND CURETTE.

BY

A. A. BRADBURNE, F.R.C.S.

SOUTHPORT, ENGLAND.

THE removal of tarsal cysts (chalazia) from the eyelids is, on account of the smallness of the hold on the lids and the slipperiness which ensues when the bleeding commences, an operation which is not as easy as it looks.



The difficulty of it is not lessened by having to change instruments, one to incise and another to scrape out the cyst.

To obviate this feature I have devised a combined instrument in which both are contained in a metal tube.

The knife blade is wedge-shaped, thus enabling the cyst to be opened by one cut, and instead of the usual sharp spoon, which gets blocked and so requires removal, a sharp ring curette is used.

Each instrument can be protruded from the tube by the fingers of one hand and in doing so the other is consequently withdrawn into the tube and cannot injure the eye or the hand of the operator or patient.

Messrs. Weiss, of Oxford Street, London, have embodied my ideas in a perfectly satisfactory manner, and the instrument can be obtained from them at a moderate cost.

REVIEW.

THE CONJUNCTIVAL TUBERCULIN TEST*

BY

HERMANN J. ACHARD, M.D.

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It is not my purpose to enter largely into the history of the diagnostic tuberculin tests in general and of the conjunctival test in particular, or to present for your consideration a large series of reports of tests, either on tuberculous or on well persons. I shall not even weary you with an extensive number of literary references, although I have, since the introduction of the local tuberculin tests in May and June, 1907, studied many hundreds of *Arbeiten* on the subject.

I rather propose to discuss the conjunctival test from a perspective view point, considering briefly its diagnostic value, its possible dangers, and its relative clinical necessity. The question to which you as ophthalmologists must more particularly take position is, whether the conjunctival tuberculin test is of sufficient value and necessity to justify its general or even frequent application in the face of the untoward results which have, infrequently it is true, been observed. Whether the possible advantages are sufficient to overbalance the possible harm and whether the procedure should be recommended to the general practitioner or should be limited to the use of the tuberculosis specialist, possibly of the ophthalmologist in behalf of the tuberculosis physician, is a proper problem for your discussion. Further, you have to determine whether the method is of value in your own work, in establishing the tuberculous nature of certain eye lesions, the ætiology of which may not be clear.

Permit me to say for the sake of correcting an error prevailing widely, that the test under discussion should not be called either by the name of Wolff-Eisner or by that of Calmette, because it is hardly a good plan to attach the name of any investigator to either a disease or a method, but if we did wish to remember the reaction by any name or names we should have to use those of both these men. Although it was Wolff-Eisner who first of all mentioned the fact that the conjunctival mucosa in tuberculous persons is

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hypersusceptible to the instillation of tuberculin in a 10 per cent. dilution (May 15, 1907), Professor Calmette exactly one month later June 17, 1907) published a method of administration for diagnostic purposes which he had already fully elaborated. Thus you see that both men have equally contributed in evolving this diagnostic method

I should like to say further, that the name selected by Calmette for his method, *i.e.*, "The Ophthalmo-, or Oculo-Reaction" is not a fortunate one, and that Wolff-Eisner's designation of "Conjunctival Tuberculin Test" should be chosen instead. The test primarily is not an ophthalmic or an ocular one because it does not involve the eye, and should not do so. It is a test applied to the conjunctiva, and in its normal evolution affects only the conjunctiva.

The specific methods for diagnosing tuberculosis may be broadly divided into two classes; first, the tuberculin tests, and, second, the serum tests; both are of immense importance for the early discovery of tuberculosis. We know from autopsy-records that far more people people are tuberculous than phthisical, which means that a great many more people are cured of their tuberculosis than die of it, and the former are cured, often without knowing of the existence of their tuberculosis. The progressive evolution of the tuberculous process into phthisis depends upon a predisposition or upon a want of resistance to the pathogenic action of the tubercle bacillus, and the occurrence of phthisis is therefore due to tuberculosis *plus* predisposition. In the predisposed especially, the earliest possible discovery of the existence of a tuberculous focus is important, clinically and prophylactically; and since environment plays a not inconsiderable rôle in the production of the predisposition, it has been suggested by Calmette, and by Wolff-Eisner, among others, that tuberculin tests should be made, in certain *milieus*, at regular intervals, in order to detect and to treat, and also to isolate cases of tuberculosis as early as possible.

The tuberculin tests depend in their action upon hypersensibility, while the serum reactions depend upon the degree or amount of protective substances which have been formed in the blood in the struggle of the organism against the infectious disease. The degree of the tuberculin reaction depends in a measure upon the amount of tuberculin absorbed, and it is for this reason that the general reaction produced by the subcutaneous, the conjunctival, and the cutaneous tuberculin tests become slighter in degree in the order named.

The serum tests, as has been stated, indicate the degree of defence put forward by the organism, and while they are of undoubted diagnostic importance (von Ruck)[1], they are of even greater importance as a means of controlling the success or non-success of the specific treatment.

It is unquestionable that the specific diagnostic methods in general constitute a very important advance in our ability to recognize the existence of tuberculous disease earlier than we have ever been in a position to do. The fact that anyone of these methods might be abused and made a *pons asinorum*, and that we might attribute less importance to a careful physical examination and painstaking appreciation of the history, the present condition, and environment of our patients because we can receive important information from such a simple proceeding as a tuberculin test or a serum examination, cannot detract from the importance of these tests in cases in which an existing lesion is not sufficiently marked to permit of calling it tuberculous and in which the sputum diagnosis, *e.g.*, is negative because the tuberculosis is as yet of the closed form. It is, however, a good plan to treat all patients suspected of tuberculosis as tuberculous, the more so since the treatment in vogue is entirely a general and common-sense one, and if it is supplemented by specific remedies these can in no way injure the

patient if properly administered; on the contrary, he will in any case benefit from such treatment. The dosages in the use of specific remedies are fortunately no longer large enough to act in the unfavourable manner in which the old tuberculin of the first tuberculin era only too often acted, *i.e.*, in reactivating a latent focus. In a condition which is manifestly and frankly tuberculous, where tubercle bacilli are found in the sputum, where we have a clear history of loss of weight and appetite, of cough, expectoration, where we have the unmistakeable physical findings of destruction of lung tissue, the application of any tuberculin test would be idle, because the purpose of these tests should only be to aid in the elucidation of an obscure condition, and not simply to gratify idle curiosity as to how a certain patient may react to the test.

If, however, the necessity exists for making a specific diagnostic test, and if the serum diagnosis (agglutination, opsonic index, etc.), is not feasible, we should carefully select the one among the many possible tuberculin tests which will offer the most definite information with the least possible degree of harm to the patient. I shall omit the subcutaneous tuberculin test from present consideration, because it will hardly be denied that this test should only be applied by specially trained physicians, and only on patients who can be under constant observation, and who can be put to bed for the time being. There remain, then, the cutaneous test of von Pirquet and its modifications, on the one hand, and the conjunctival tuberculin test or its modifications, in which the tuberculin is applied to a mucous membrane. In both classes we need not really consider the modifications at all, because they do not constitute any essential differences.

A tuberculin test may be applied for one of several possible purposes:

(1) To determine whether the tubercle bacillus has at one or another time come in contact with an organism, or, as von Pirquet expresses it, whether the organism "has become acquainted with the tubercle bacillus."

(2) To determine the existence of an active tuberculous process somewhere in the body, or to determine whether a certain process or lesion is tuberculous.

(3) To determine whether a tuberculous process has been arrested, and whether it may be considered as healed.

The first point is of somewhat academic interest, and does not necessarily determine the existence of an active or progressive tuberculous process, since this may be quiescent or latent. If an organism has ever been infected with tubercle bacilli, it will usually react to the cutaneous tuberculin test, no matter whether the process is active or latent, or even healed. This test is therefore of greater diagnostic value if negative. It gives comparatively little, if any, information concerning the presence of active disease. It has, however, been of considerable assistance in verifying the results of the autopsy records of Naegeli, Schmorl, Lubarsch, and others, and of the subcutaneous test made, *e.g.*, by Franz, for the purpose of determining the general distribution and frequency of tuberculosis; and it has been stated by von Pirquet himself, that on account of the extreme sensitiveness of his test, at least 90 per cent. of healthy adults react to it, because this proportion has at one time or another been infected by the tubercle bacillus. This, according to Hamburger,[2] is already the case, for the population of Vienna at the age of fourteen.

The cutaneous test, while thus not of immense diagnostic value, on the other hand assists in showing the essential curability of tuberculosis; in fact, it proves what I have said before, namely, that a great many more people are tuberculous than die of tuberculosis. Over ninety per cent. of all adults react to the cutaneous tuberculin test; only about eleven per cent. die of the disease, the other seventy-nine per cent. recover.

The third point, which we will discuss before the second, has been insisted upon for the subcutaneous test by Drs. Carl and Silvio von Ruck[3] in 1899, by Heron[4] in 1901, and by others, for instance Mitulescu, more recently. Dr. Silvio von Ruck[1] concludes from his experience with the conjunctival tuberculin test that it may be asserted it also may supply the final proof of a cure, just as the subcutaneous injections have been employed for the same purpose.

The principal purpose of the diagnostic tuberculin application is, however, to ascertain whether a given lesion or pathological process is tuberculous in nature. On employing diagnostic sub-cutaneous tuberculin injections this is ascertained with comparative ease because of the occurrence of a focal reaction, which is of even greater importance than are the general symptoms of fever, malaise, etc. In the so-called local tuberculin tests too little tuberculin is, as a rule, introduced into the circulation to bring about such a focal reaction; in fact, for the cutaneous modes of administration, I have not found a single instance recorded, and only few general reactions have been reported. After the conjunctival tuberculin test, I have, in the Winyah Sanitarium in Asheville, North Carolina, seen the focal reaction occur in at least three early cases of apex localization, and I am told by Dr. von Ruck that in the course of the last two years about twenty more have been observed. The occurrence of such a focal reaction would naturally tend to make the test of greater diagnostic value by indicating the exact seat of a tuberculous focus. In general, it is asserted that with a proper attention to conditions, and with a proper interpretation, a positive conjunctival tuberculin reaction indicates the existence of active disease.

In the application of any diagnostic or therapeutic measure whatever the foremost principle to be observed is that of *nil nocere*, and we may properly raise the question as to whether the tuberculin tests fulfil this postulate. For the cutaneous test we may reply affirmatively without hesitation; at least, I have not found a single case recorded in which it has produced more than, at most, a passing and very slight local discomfort, and the instances of general reaction were only minimal in degree and number. In regard to the conjunctival test, both Calmette and Wolff-Eisner speak of many thousands of tests of which they have record, and in which no permanent harm has resulted from its administration.

The phenomenon of anaphylaxis, upon which the tuberculin tests depend, is a very difficult one, and by no means fully understood. Permit me to say, in passing, that it was not Richet, as is frequently asserted (on his own authority), who studied the question first. About the middle of the eighties von Behring investigated what he called hypersensitiveness. Briefly, anaphylaxis, or, perhaps, better *allergie* (von Pirquet), consists in the fact that a second introduction of a foreign proteid into an animal organism produces a distinct reaction which is not observed after the first introduction. Using a specific proteid, such as horse serum, or a toxin, *e.g.*, tuberculin, the first introduction into what the French call a "new" organism, remains without any symptoms; but if sometimes before the injection of serum an amount, although small, has been introduced, or if in the case of a tuberculin injection the organism had at some earlier time been subjected to a tuberculous infection with subsequent tuberculosis, in the course of which tuberculous toxins (tuberculin) have been set free, a fever reaction occurs to the tuberculin administration. This is local or general, or both, according to the dose absorbed, and according to the power of reaction of the organism, and gives sometimes rise to focal inflammatory symptoms, von Pirquet was led to employ this fact in the cutaneous adminis-

tration of tuberculin, and Wolff-Eisner, and soon after him Calmette, argued that the far more delicate membrane of the conjunctival sac would be more apt to respond to the slightest stimulation. After that, as might be expected, the other accessible mucous membranes, those of the nares, the vagina, and even of the urethra, were subjected to the local application of tuberculin in a craze for producing modifications of the method, just as the cutaneous tuberculin test has been modified in every conceivable manner.

Most tuberculosis physicians who have employed the conjunctival tuberculin test agree in the assertion of its originators, that the undesirable, and even serious, symptoms and accidents which have been observed in the course of the reaction, are due to faulty *technique* and to improper selection of cases, and that with an exact method and a careful observance of contraindications, the test is without danger. I do not desire to deny this; in fact, I am convinced, from my own observation and from a careful study of the literature, that most of the reported accidents could have been avoided. I also admit that the possible, but remote, danger of a remedy or method does not *ipso facto* justify its condemnation. We would not dream of giving up ether or chloroform narcosis in spite of the not inconsiderable number of deaths due to both. We continue to prescribe morphine, nitroglycerine, strychnine, atropine, and other powerful drugs, although they have many deaths to their credit. Laparotomy is a recognised and just mode of interference in many pathological conditions, although a large number of patients have succumbed to the operation. But we are careful to obtain the services of a trained anæsthetist to administer the ether or chloroform for us. We prescribe or dispense the exact amount of morphine, nitroglycerine, strychnine, and atropine, which we consider necessary for a particular condition, and no more. We prefer to have our laparotomies done by men who have fitted themselves for the work, and who fully understand and are able to cope with the possible dangers, and to eliminate every such possibility as much as feasible.

In the same way, I hold that the conjunctival tuberculin test, employed by unskilled hands in improperly selected cases, is a dangerous procedure; not so much on account of any inherent toxicity of the remedy, the dose employed being far too small to exert any notable toxic effect, but on account of the extreme sensitiveness and vulnerability of the organs involved. If it is improper for the general practitioner or for anyone but a skilled ophthalmologist to operate upon the eyes, it is equally improper for them to subject these organs to the possibility of injury which undoubtedly is present in a deliberately produced conjunctival inflammation, and this is especially true when there are present any affections of the ocular apparatus, whether they are tuberculous in nature or not; it is even true when there is a history of earlier though healed disease in the eye, as we shall see presently. It has been shown (first, I think, by Feer[5] in Heidelberg, and by Citron[6] in Berlin) that scrofulous children show especially marked reactions to the conjunctival tuberculin test. According to Wolff-Eisner's reasoning, this might be explained as indicative of a fair degree of tuberculous immunity enjoyed by such children; but however that may be, the fact remains that the test may expose the eyes to very grave danger, and a considerable number of cases are on record in which even permanent injury has resulted.

Apart from the possible dangers of the procedure, opinions are practically unanimous concerning the diagnostic value of the conjunctival tuberculin reaction. It is almost generally conceded that a marked positive reaction indicates an active disease to which the organism opposes a satisfactory degree of resistance. Lesser reactions have been explained as designating latent-

inactive or latent-active foci, and negative reactions in frankly tuberculous cases show the absence of any power of resistance and are prognostically unfavorable, while negative reactions in clinically non-tuberculous persons may be accepted as indicating the absence of tuberculosis, if supplemented by a negative cutaneous tuberculin test, which then means that the particular organism has never been subject to tuberculous infection at all.

It is strange, in view of the many favourable opinions, that Maragliano[7] has arrived at an almost opposite conclusion. He denies the value of the conjunctival test *in toto*, and ascribes the favorable reports to auto-suggestion on the part of the investigators, or to deliberate irritation of the conjunctival mucous membrane. F. P. Weber[8] also believes that there has undoubtedly been a tendency to magnify the reaction as a diagnostic test of tuberculin. Bandelier-Roepke[9] insists that the conjunctival tuberculin test *must* remain unreliable in human tuberculosis, and especially that it may remain negative in spite of active tuberculosis, because the admissible strength of solution does not always produce a reaction (*loc. cit.* page 37).

Von Szaboky[10], in Graz, found that the cutaneous tests gave better results in the early stages of pulmonary tuberculosis than did the conjunctival, but less good results in the second and third stages; but considering that in the clinically non-tuberculous the conjunctival test is rarely, the cutaneous often, positive, and that in suspected cases the conjunctival test gives valuable information, the author nevertheless thinks it the more valuable of the two, although he denies its specific character. Many authors, for instance C. Annoni[11], admitting that the conjunctival tuberculin test is of at least equal value with the cutaneous, nevertheless prefer the latter, at least in children, because it has no contra-indications, is easily managed and watched, and is not productive of disturbance.

It has been shown by von Ruck[1] that the occurrence of the conjunctival tuberculin reaction in tuberculous patients is influenced by specific treatment. Of 44 untreated cases, 63·64 per cent. gave a positive reaction. Of 34 cases under specific treatment for a short time, 44·1 per cent. reacted. Of 18 cases under specific treatment for six months or longer, 27·7 per cent. reacted. Of 23 healed or arrested cases, none reacted. It is therefore stated, for instance by Eyre, and Wedd and Hertz,[12] that the conjunctival reaction will be of value in indicating when therapeutic injections of tuberculin may be safely discontinued.

As to the possible danger of the reaction, Calmette[13] claimed, on the occasion of a comparatively early report before the Academy of Medicine in Paris, January 14th, 1908, that in more than 10,000 cases already tested, the harmlessness of the method had been proved. In the discussion of this report, Delorme[13] cited 39 cases in which excessive reactions had occurred, and since that time many more severe reactions productive of discomfort and pain—in fact of ocular disease lasting for weeks and even months, and some cases even of permanent injury—have been reported. For this reason Wiens and Guenther[14] warn against the test as by no means such a simple matter as had been assumed. It is liable to aggravate a simple conjunctivitis and to cause serious trouble, as they illustrate by several instances from their experience. Reichmann[15] indeed concludes that the test, in spite of its apparent simplicity, is not adapted for the general practitioner, since the patient should be kept under close observation—this in spite of its undoubted clinical value.

The fact that serious accidents have sometimes followed the administration of the conjunctival tuberculin test, can, it is true, not argue against its usefulness, but it renders the test inadvisable for the general practitioner. Even a mild conjunctivitis which may pass off in a week or two may cost the physician his patient. People do not enjoy being made the subject of what

they conceive to be experiments. Unless we can assure them that a certain procedure is therapeutic and undertaken with a curative aim, they will have none of it. If any test possesses a possibility of harm, the patient must be fully informed of the nature of this possibility, and must decide for himself whether he will or will not have the test applied.

In the causation of the untoward results observed there are several factors to be considered, which are enumerated by Smithies and Walker[16] as follows: (*a*) The possibility of poor *technique* in administering the tuberculin. (*b*) The possibility of difference in the tuberculin preparations used. (*c*) The difficulties encountered in demonstrating certain cases to be clinically tuberculous, *i.e.*, the difficulty in the explanation of the reaction. (*d*) The lack of definite or uniform standards for judging the occurrence or the severity of the conjunctival reaction. (*e*) The possible presence of unknown conditions which may modify or prevent the reaction in tuberculous patients, or which might bring about a reaction in non-tuberculous patients. Smithies and Walker give their opinion that none of the tuberculin reactions can take the place of thorough examination of the patient from every viewpoint.

Roepke[17] obtained a greater number of positive reactions by repeated instillations in the same eye, and in this manner reactions have often been obtained in healthy persons. So Klieneberger[18] found that the instillation of tuberculin in the healthy conjunctival sac of a healthy person produced an anaphylactic condition through which a second instillation in the course of about eight days was followed by a positive reaction. Wolff-Eisner[19] therefore advises that the second instillation, if it is necessary, should be made in the eye not previously tested.

A. Napier[20] reports two cases, tending to show that the instillation of Calmette's solution, even when it gives rise to no apparent reaction, brings about a local change of some kind which responds sharply to the subsequent introduction of even a moderate dose of tuberculin into the circulation. It then causes the conjunctiva to react locally, exactly as a latent tuberculous focus would. S. Cohen[21] also reported that a subsequent subcutaneous injection of tuberculin is liable to produce a local reaction in the eye, if this had not been observed before, or cause it to return after it had already gone down. Smithies and Walker (*loc. cit.*) say that one of them was able to produce a slight conjunctival reaction in himself by the subcutaneous injection of one milligram of tuberculin after a previous instillation of tuberculin in the conjunctival sac had failed to give a positive reaction. Stadelman[22] found that the cutaneous as well as the conjunctival reaction is liable to flare up again if tuberculin be injected for ordinary diagnostic tests or for the purpose of treatment even weeks after the primary reactions had disappeared. Many physicians, for instance Schrumpf[23] of Strassburg, have encountered considerable difficulty in administering tuberculin for the purpose of treatment in patients who had been subjected to the conjunctival tuberculin test, because the conjunctival reaction would return again, and sometimes cause distressing symptoms.

The contra-indications to the instillation of tuberculin in the eye are given by S. G. Higgins[24] as follows: "The existence of inflammation of the eye, especially the exterior, such as trachoma, or conjunctivitis, or the presence of corneal scars. Further, it is ill-advised to employ tuberculin in one eye if the other has been diseased. Also disease of the deeper tissues, such as choroiditis, furnishes a contra-indication. The test should not be made in old people, whose tissue resistance to any inflammation is impaired. Errors of refraction and eye-strain are not a contra-indication, but when the evidences of a marginal blepharitis are present, the test may prove confusing."

The striking point in regard to the conjunctival tuberculin reaction is, that there exist a good many contra-indications which are entirely absent from the cutaneous method. Above all is the fact of importance that in scrofulous children especially, the conjunctival tuberculin test is exceedingly apt to cause very severe reactions and painful and prolonged injury, not only to the conjunctiva, but even to the eyeball. Yet it is especially in this class of cases that a specific diagnostic method would very frequently be desirable, and since just here the conjunctival test must fail us because it is contra-indicated, we labour under a very considerable handicap. Fortunately, the cutaneous and subcutaneous tuberculin tests, or some of their modifications, are fully of a nature to afford us the information which we desire, provided they are properly interpreted.

The conjunctival tuberculin test suffers also under the disadvantage that its administration is practically limited to two applications. We have seen that repeated instillation of tuberculin in the same eye cannot afford any definite information, because a condition of hypersensitiveness is created by a first application which would in itself produce a positive reaction to a second application. Now if, as asserted by Roepke, only fifty per cent. of tuberculous patients react to a first instillation of a two per cent. solution of tuberculin in one eye, the possibility of error by this method is very considerable.

A further disadvantage of the conjunctival method is that the *technique* is not by any means as simple as Wolf-Eisner[25] would have us believe. He claims in the second edition of his book that the *technique* is even simpler than for the cutaneous tuberculin test, but we find in practice that it is by no means as easy to obtain the permission of our patients to instil, no matter what, solution into their eyes as it is to get them to submit to a simple little scratching of their arms, the more so since we can positively promise them that the cutaneous administration of tuberculin will in no case produce a painful lesion and will only cause a slight redness with, at the worst, a very inconsiderable itching, while we cannot be as positive in our promises when we make a conjunctival tuberculin test. The positive reaction is not devoid of pain or discomfort and is in a great many cases accompanied by a good deal of very positive distress and loss of function. Moreover, the instillation of tuberculin is often useless, because the tuberculin may be washed out by lacrymation and this may lead to a faulty diagnosis. It is for these reasons that I would refrain from encouraging the general practitioner to administer the conjunctival tuberculin test.

From the foregoing considerations we conclude that the conjunctival tuberculin test, as proposed by Wolff-Eisner and Calmette, is of undoubted value for determining the existence of an active tuberculous process. We admit that it may to a certain degree be of prognostic value, as asserted by Wolff-Eisner. We find further that the test affords us a valuable information as to the possibility of discontinuing specific treatment and as to the accomplishment of a cure. It is agreed that the method is a valuable one and in selected and indicated cases to be recommended, but all this with the proviso that the test should be carried out by physicians who have studied the problems involved carefully, who are fully aware of the possible dangers and are able to, if not prevent, then to cope with them, and with the further proviso that all contra-indications and precautions should be duly considered. In the great majority of cases, however, I hold that a diagnostic method which is productive of a very real, even if slight, amount of discomfort and which has an intrinsic possibility of danger, should be employed only after all other methods of ascertaining the existence or absence of tuberculosis have failed. There are so many other methods of examination, more especially the careful consideration of the history of the patient, of his physical condition,

of his environment, the conditions under which he lives and has lived, etc., that the conjunctival test should become necessary in a very small number of cases, and then should be carried out only under the conditions enumerated.

There is another aspect of the question in which you as ophthalmologists are more immediately concerned, and that is the employment of the tuberculin test to determine the tuberculous nature of an existing eye lesion. Sydney Stephenson[26] was one of the first ophthalmologists to apply the test for the differential diagnosis of ocular lesions. Stuelp[27] observed that nine out of fourteen eye patients with tuberculosis or symptoms of tuberculosis, after instillation of tuberculin, gave severe inflammatory symptoms lasting up to seven weeks, in eyes which were formerly diseased or if the other eye was affected. Brons[28] maintains that the conjunctival tuberculin reaction cannot be interpreted to be an indication of tuberculous involvement of that eye. G. S. Derby[29] has tested about 150 cases of eye disease, in order to determine their tuberculous nature. His experience has led him to fear the conjunctival test in all diseased eyes, even though the process is healed, and in the healthy eye when there is active disease in the cornea in the other. Bandelier-Roepke say that the conjunctival reaction should not be produced when there exists a suspicion of eye tuberculosis (*loc. cit.* 91).

Verhoeff[30] says: the conjunctival test for tuberculosis would seem at present to be of very limited value so far as the diagnosis of ocular tuberculosis is concerned. The test, in his opinion, should never be used for this purpose, since it is not entirely free from danger to the eye. Moreover, it is unsatisfactory, because the affected eye can neither serve as a control, nor be used for a second instillation.

L. C. Peter[31] is of the opinion that as a diagnostic agent, from an ophthalmic point of view, the Calmette reaction has little to commend itself in determining the character of lesions and diseases of the eye. The possibility of causing serious damage by a single application to an eye which may be the seat of even a low-grade conjunctivitis, or to a perfectly healthy eye by repeated instillations, has been fully demonstrated. These results may be obtained in an eye which is not the seat of tuberculous processes, and, therefore, in addition to the dangers, there is an element of uncertainty added, which largely nullifies the value of the test. The natural inference, therefore, according to Peter, is that the Calmette test should not be used in determining eye conditions. He wishes to emphasize the conclusion, because we have other and better methods of application without the risk of serious injury which may attend the conjunctival test.

In the first discussion of the subject, which occurred in the Chicago Medical Society (February 28th, 1908), your secretary, Dr. G. F. Suker[32] warned against the indiscriminate use of the conjunctival tuberculin test, and called attention to its possible dangers. Only the other day my attention was called to Sydney Stephenson's[33] translation of Darier's *Ophthalmic Therapeutics*, just off the press, in which the method is discussed, and I cannot do better than to close my paper by quoting the opinion of your guest of honour. Stephenson says, on page 8, "The method is valuable in general diagnosis, but in ophthalmic practice it should not be used, for if a slight tuberculous lesion of the cornea or iris is present, it may set up serious complications gravely endangering the sight of the affected eye. Moreover, in the absence of all tuberculosis the ophthalmic reaction may provoke a conjunctivitis difficult to cure, especially when a follicular state of the mucous membrane already exists, and still more so when the individual is affected with trachoma, even of slight degree."

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(2a) **Frz. Hamburger.**—*Allgemeine Pathologie und Diagnostik der Kindertuberkulose*, Leipzig u. Wien, 1910.

(3) **K. and S. von Ruck.**—*A Clinical Study of 261 cases of Pulmonary Tuberculosis.* Asheville, N.C., 1905, *Journ. of Tuberculosis*, Vol. I, 1899, p. 179.

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(21) **S. Cohn.**—*Berl. Klin. Woch.*, Bd. XLIV, 1907, S. 47.

(22) **Stadelmann.**—*Deut. med. Woch*, Bd. XXXIV, 1908, Februar 13. Abstracts *Journ A.M.A.*, Vol. L, 1908, p. 1000.

(23) **Schrumpf.**—*Munch. med. Woch.*, Bd. LV, 1908, S. 43. Abstracts *Ztschr. f. Tub.*, Bd. XIV, 1909, S. 160.

(24) **S. G. Higgins.**—*Wisconsin Med. Journ.*, Vol. VIII, 1910, p. 610.

(25) **A. Wolff-Eisner.**—*Fruchdiagnose und Tuberkulose-Immunitat, 2te Aufl. Würzburg.*, 1909.

(26) **Sydney Stephenson.**—*Brit. Med. Journ.*, October 19, 1907. Abstract *Ophthalmology*, Vol. IV, 1908, p. 333.

(27) **Stuelph.**—*Klin. Monatsbl. f. Augenheilk.*, Bd. XLVI, 1908, S. 292, *cf* S. G. Higgins, ref. 24.

(28) **Brons, Ibidem.**—Abstract *Ophthalmology*, Vol. IV, 1908, 4.

(29) **G. S. Derby.**—*Archives of Ophthalmol.*, September, 1908. Abstract *Ann. of Ophthalmol.*, Vol. XVIII, 1909, p. 328.

(30) **Verhoeff.**—*Ophthalmic Record*, March, 1909, *cf.* S. G. Higgins. Ref. 24.

(31) **L. C. Peter.** *Medical Record*, Vol. LXXVII, 1910, p. 14.

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CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—GLAUCOMA AFTER CATARACT EXTRACTION.

(1) Chance, Burton.—Glaucoma after the extraction of cataract. *Ophthalmology*, July, 1910.

(2) Goldberg, Harold G.—Glaucoma following cataract extraction. *Ophthalmology*, July, 1910.

(3) Risley, S. D.—Glaucoma after cataract extraction. *Ophthalmology*, July, 1910.

These three papers were given before a "symposium" of the Wills Hospital Ophthalmic Society, on February 1st, 1910.

Chance deals in an inreresting way with the literature of this grave, but fortunately rare, complication of cataract extraction, since it was first referred to by Bowman in 1865. The only figures quoted regarding its frequency are those of Treacher Collins (*Trans. Ophth. Soc. U.S.*, vol. X.), who found nine instances among 1,405 extractions of senile cataract at Moorfields from 1885 to 1889. From his statistics and the experiences of others, it appears that the complication may occur after any form of cataract extraction, simple, combined, with preliminary iridectomy, and even after extraction in the capsule. It does not appear to be due to any inherent tendency to glaucoma in the affected eyes. A number of factors have been adduced to explain the occurrence, such as swelling of retained cortex, irido-cyclitis, dragging on the iris and ciliary body, and delayed union of the wound, allowing the conjunctival epithelium to proliferate in the anterior chamber and to block the filtration channels. It is generally believed that a feature common to all cases is incarceration of iris or lens capsule in the wound, and it is supposed that in this way the iris may be dragged forward sufficiently to block the angle of the anterior chamber. Another possible occurrence, of which Chance has had personal experience, is that of a membrane sufficiently transparent to elude observation, yet secluding the pupil and preventing the interchange of fluids between the vitreous and anterior chambers. In such a case the membrane might be divided by the knife-needle. Generally speaking, this form of glaucoma defies treatment, but the treatment is that appropriate to primary glaucoma. Prevention should be aimed at by attention to such details of operative technic as choosing a form of incision which will rapidly heal, and avoiding the entanglement of iris, lens matter, and capsule in the wound. Chance thinks that in dividing a capsular membrane the danger of this complication is reduced to a minimum by the use of a knife-needle with a tapering shank and by entering its point behind the limbus.

A histological study of an eye affected with glaucoma after cataract extraction is contributed by **Goldberg.** The clinical features of the case are not given. The anterior part of the eye was staphylomatous. Anterior chamber was deep, and there was a layer of blood lining the back of the cornea and front of the iris. There was a mass of organised blood clot at the site of the iridectomy. Iris, ciliary body, retina, and choroid were degenerated, and there was sclerosis of the walls of the choroidal vessels. The condition

of the operation wound is not referred to, but it is stated that the angle of the anterior chamber, Schlemm's canal, and the spaces of Fontana were open. Goldberg concludes that the glaucoma in this case was "of blood vessel formation."

Risley describes a case of unusual interest.—The patient, a labourer, aged 52, had cataract removed by the combined method in February, 1890. Recovery was uneventful. There was no involvement of iris or capsule in the wound. Vision was $\frac{6}{6}$. In July, 1907, more than seventeen years later, he began to have recurring attacks of pain and injection of the eye with impaired vision. When he returned to the clinic in December, 1909, the eye was quiet, the media clear, but tension was +2, and vision reduced to perception of light in a small area in the temporal field. There was a deep glaucomatous cup and atrophy of the optic nerve, while the iris looked healthy and the anterior chamber of normal depth. Thus nothing could be discovered in the condition of the eye to account for the occurrence of glaucoma, and it is equally difficult to believe that the glaucoma was a sequel to the operation at a distance of seventeen years, and that a sub-acute inflammatory glaucoma can occur in an aphakic eye, with a broad coloboma in the iris, and no disease to account for closure of the filtration channels. A. J. BALLANTYNE.

II.—RETRO-OCULAR NEURITIS.

(1) **Stricker, Louis.—Toxic amblyopias, with reports of twenty-four cases.** *Cincinnati Lancet-Clinic*, 2nd May, 1908.

(2) **Claiborne, J. Herbert.—A case of retrobulbar optic neuritis, with remarks.** *American Journal of Ophthalmology*, January, 1909.

(3) **Sauvineau.—Iodoform amblyopia.** *La Clinique Ophtalmologique*, 10 juillet, 1909.

(1) **Stricker,** of Cincinnati, feels it is justifiable to regard toxic amblyopias primarily as the results of disease of the ganglion cells of the retina. In severe intoxication, the ganglion cells die primarily, under which circumstances, the acute form of the condition presents itself. The poison acts directly and with great force. In the chronic forms, the nutrition of the ganglion cells is altered, the axis cylinders dying first. The poison in an attenuated form acts either directly upon the ganglion cells of the retina or upon their axis cylinders. In this type of cases, it may act indirectly upon the vascular system, by producing an arteriosclerosis which impairs the nutrition of both the retina and the optic nerve. CHARLES A. OLIVER.

(2) **Claiborne** reports a case of retrobulbar neuritis which, like many other such cases, was of quite doubtful ætiology. The author says it was "evidently due to cold," which one cannot help thinking, after reading the case, is rather a speculative diagnosis. She was only seen by Claiborne a month after the patient had observed anything wrong. ERNEST THOMSON.

(3) **Sauvineau** reports the case, retrospectively, of an engine driver, who after receiving a severe burn was freely treated with iodoform powder (1895). Two and a half months later, his vision began to deteriorate, and he was found to have a central scotoma much more marked for green than for red. There was a slight "effusion" of the papillæ which the author considers as evidence of toxic retrobulbar neuritis, but he has not excluded tobacco as a cause.

Moreover he continues :—" Contrary to what occurred in the cases published by M. M. Valude and C. Terson, and in the case spoken of by Morax in the discussion which followed M. Rochon-Duvigneaud's communication—cases which ended, every one of them, in optic atrophy—in my case the cure was maintained and remains perfect now, 15 years afterwards.' From this he concludes that the prognosis is not so bad as previously published cases would lead one to fear, but that in any event iodoform in large doses should be looked at askance. (Rochon-Duvigneaud's case *apropos* which this article was written seems to have been an iodoform intoxication following the injection of iodoform-glycerine into a cold abscess.) ERNEST THOMSON.

III.—DISLOCATION OF THE LENS.

(1) **Vogt, A.—Spontaneous dislocation of the lens as an hereditary disease.** (**Dislocatio lentis spontanea als erbliche Krankheit.**) *Zeitschr. f. Augenh.*, July, 1905.

(2) **Adams, P. H.—A family with congenital displacement of lenses.** *Transactions Ophthalmological Society U.K.*, 3rd fascic, 1909.

(1) **Vogt** gives the histories of 15 cases of spontaneous dislocation of the lens in adult life, and all in members of the same family. The first trace of this disease occurred about 100 years ago, and this ancestor transmitted the disease to several of his children. And so on to the third and fourth generation. The disease attacks especially males, 50 per cent. of those examined and only 12 per cent. of women, and there was no case of transmission through females.

The dislocation occurred between the ages of 20 and 65, and was followed very rarely by mild secondary glaucoma. As a rule, no evil results beyond bad vision came on. A. LEVY.

(2) The family put on record by **Adams**, of Oxford, consisted of a mother and nine children. The mother and seven children had displacement of the lenses. The two children unaffected appeared to be more intelligent than, and "obviously different" from, the others. The situation of the displaced lenses was unusual in four cases ; in three cases the lenses were displaced, and in one case completely dislocated downwards ; whereas, as usually stated, the lens should be displaced upwards owing to deficiency of the suspensory ligament opposite the fœtal cleft. The fundi were all normal and there were no other abnormalities. ERNEST THOMSON.

IV.—CONJUNCTIVITIS.

(1) **Le Roux.—On the prophylaxis of ophthalmia neonatorum.** (**Du traitement prophylactique de l'ophtalmie purulent des nouveau-nés.**) *L'Ophtalmologie Provinciale*, T. V., p. 154, octobre, 1908.

(2) **Widmark, J.—Minor ophthalmic observations.** (**Kleinere ophthalmologische Beobachtungen.**) *Mitteilungen aus der Augenklinik des Carolinischen Medico-Chirurgischen Instituts zu Stockholm.* 1910.

(3) **Trousseau.—A new form of conjunctivitis.** (Une nouvelle variété de conjonctivite.) *Ann. d'Oculistique*, janvier, 1910.

(4) **Trousseau, M. A.—La conjonctivite purulente.** *Gazette des Hôpitaux*, 3 fevrier, 1910.

(1) **Le Roux**, of Caen, urges that Crede's method for the prophylaxis of ophthalmia neonatorum should invariably be carried out, but considers that a 1 in 150 solution of nitrate of silver is sufficiently strong. R. J. COULTER.

(2) In this short article **Widmark**, of Stockholm, assembles three short papers.

The first he heads "An unusual form of conjunctivitis." He describes a peculiar form of inflammation of the conjunctiva, which he has often observed during the past ten years. The changes are almost invariably confined to the lower lid and to the ocular conjunctiva under the cornea. Simple inspection does not show any marked change, but the whole affected area stains with fluorescein. There is occasionally slight stippling of the cornea. Recovery is generally rapid. Yellow ointment is the best remedy.

The second paper describes an iris tumour which did not alter its appearance during several years. The tumour, which is obvious in a good photograph of the eye, was held to be a melanoma of benign nature, and was left alone.

The last paragraphs discuss an aspect of the actiology of spring catarrh. It has been suggested that this disease is caused by ultra-violet radiations. If this were so, it should be very common during the long summer of Northern Scandinavia, where the sun never sets, and there is much reflected sunlight from snow. But Widmark could hardly recollect having seen a case from Northern Sweden. He wrote, however, to several ophthalmic surgeons who practised in the northern towns of Sweden and Norway. The answers he received convinced him that vernal conjunctivitis was a very rare disease in Scandinavia. He therefore feels that his enquiries lent no support to the view that sunlight is the cause of the disease. T. HARRISON BUTLER.

(3) **Trousseau**, of Paris, records the case of a woman, aged 22, who between June, 1906, and December, 1908, had three attacks of a peculiar affection characterised by the presence of grey or reddish nodules situated on the bulbar conjunctiva near the cul-de-sac. The nodules could not be seen when the eyes were open to a normal extent, but when the lids were closed, they caused elevations resembling chalazia. They were collected into groups 3 or 4 mm. thick, and 4 to 6 mm. in their greatest diameter, which were freely moveable over the eyeball, and very slightly tender. They were always separated from the cornea by a space of at least 7 mm., and they were never more than four groups present at the same time. Each group remained present for from 2 weeks to 2 months, but owing to the occurrence of successive eruptions, the average duration of each attack was three months. There was no abnormal secretion, and the patient felt only slight discomfort. There was no glandular enlargement, and the lids were normal all the time. Between the attacks the conjunctiva was normal.

The patient was of a neurotic type and subject to dry eczema, migraine, localised œdema, urticaria, gastro-intestinal troubles, hay fever, and muscular and articular rheumatism, in spite of which she is described as fairly robust. There was no disease of the nasal cavities or accessory sinuses, and the blood was practically normal, but the urine was loaded with uric acid. The conjunctival attacks were preceded by a feeling of malaise with a tendency to migraine, gastro-pyloric spasms, and patches of œdema the size of a 5 franc piece usually on the hairy scalp.

Smears of the conjunctival discharge contained only epithelial cells, and microscopic examination of an excised nodule shewed that it consisted of connective tissue infiltrated with leucocytes, chiefly mononuclear and covered by stratified epithelium The appearances resembled those found in a lesion of nutrition rather than an inflammation. There were no tubercles, and inoculation of a guinea pig with a piece of the excised nodule gave a negative result.

Various treatments were tried, none of which had any influence on the condition. R. J. COULTER.

(4) **A. Trousseau,** of Paris, advocates as prophylactic measures in ophthalmia neonatorum the examination of pregnant women, at least a month and a half before full term, and the treatment by vaginal douching of those infected, as well as the questioning of the husbands by the accoucheur. He still finds it necessary to order the banishment of forceps and silver nitrate crayons.

After wiping the lids of the newly-born child with absorbent cotton, which must be dry, he separates the lids gently and douches with cyanide of mercury 1 in 10,000 by means of a little glass ball with two tubes, devised by himself. He then applies Credé's method, letting fall into the eye one or two drops of 2 per cent. silver nitrate. In his opinion, nothing should take the place of silver nitrate. Besides compulsory notification of the disease, he recommends that there should be issued to every person notifying a birth a printed notice indicating the gravity of the disease without mentioning treatment, and directing those affected to be taken at once to a medical man.

In the treatment of this affection sublimate solutions and those containing alcohol are especially to be avoided. Trousseau considers that neutralisation with salt solution after silver nitrate application is unnecessary. He recommends the use of cold or iced compresses.

Although good results have been obtained by Kalt's potassium permanganate method, it should not replace the classical treatment in every case.

For the after-thickening of the palpebral conjunctiva, he recommends the use of a 7½ per cent. solution of copper sulphate in glycerin.

In conclusion, he gives as a maxim that we should never despair of an infant's cornea. H. HAWARD BYWATER.

V.—OPERATIONS.

(1) Widmark, J.—**On delayed reformation of the anterior chamber after cataract extraction.** (Ueber verspätete Wiedirherstellung der Vorderkammer nach Starextraction.) *Mitteilungen aus der Augenklinik des Carolinischen Medico-chirurgischen Institutes zu Stockholm*, 1910.

(2) Wirtz, Robert.—**Complete sloughing of the cornea after a squint operation.** (Totale Vereiterung der Hornhaut nach einer Schiel-operation.) *Zeitschrift f Augenheilkunde*, Januar, 1910.

(3) Verderame, Filippo.—**On the transplanting of adipose tissue in cases of adherent cicatrix at the orbital margin.** (Sul trapianto di tessuto adiposo nelle cicatrici aderenti al margine orbitale.) *Archivio di Ottalmologia*, January, 1910.

(4) Bettremieux.—**On the mode of action of, and the indications for, simple sclerectomy.** (Mode d'action et indications de la sclérectomie simple.) *Ann. d'Oculistique*, janvier, 1910.

(5) Alt, Adolf and Sauer, W. E.—A case of orbital cyst. *American Journal of Ophthalmology*, February, 1910.

(6) Rollet, E.—Treatment of ptosis by an open method of frontal blepharopexy. (Traitement du ptosis par la blépharopexie frontale à ciel ouvert.) *Revue Générale d'Ophtalmologie*, 28 février, 1910.

(7) Franhe, E.—On plastic operations upon the lids and to reform the conjunctival sac. (Ueber plastische operationen an den Lidern und zur Wiederherstellung des Bindehautsackes.) *Zeitschrift f. Augenheilkunde*, Februar, 1910.

(8) Dor, Louis.—Provisional surgical treatment of medically curable paralytic ptosis. *La Clinique Ophtalmologique*, 10 mars, 1910.

(9) Gaupillat, D.—Anterior synechotomy or disengagement of the iris. *La Clinique Ophtalmologique*, 10 avril, 1910.

(10) Abadie, Charles.—Glaucoma cured by a simple division of the iris. *La Clinique Ophtalmologique*, 10 juin, 1910.

(1) The late Professor **Widmark**, of Stockholm, in this paper brings together much information which will be of great help to the surgeon who is faced by this disconcerting complication. In about 2 per cent. of extractions late healing is noticed. The wound may not have closed at the end of a week, or more rarely at the end of several weeks. In one case the final closing of the incision was prolonged to the sixtieth day. Widmark gives a tabulated list of all the cases of late union which are recorded in the case-books of the *Seraphim Lazarette* at Stockholm. The cause is not always clear. It has been suggested that cocaine is the ætiological factor, but the author has noticed that delayed union more frequently follows a corneal incision than a scleral. He ascribes the complication to a failure in *technique*. Very frequently iris or capsule is included in the wound, and this mechanically prevents rapid union.

Delayed union may end in several ways.—Generally, there is no sign of any inflammation, and eventually the wound heals without unfavourably affecting the final result. But, frequently, an opacity of the cornea appears, which may be slight or sufficiently dense to necessitate iridectomy. The eye may become infected, and panophthalmitis may develop, or glaucoma may complicate the case. This is, Widmark says, more commonly seen after the combined than after the simple operation. In some cases the wound never heals at all—a permanent fistula remains, and eventually the eye becomes soft and ultimately blind.

In most cases the best treatment is complete rest in bed with a firm bandage. The cautery can be used in chronic cases, and lotions of bichloride of mercury, sufficiently strong to cause slight irritation (1 : 5,000), may prove of service.

T. Harrison Butler.

(2) **Wirtz** (Stuttgart) narrates an accident which should be a warning to all ophthalmic surgeons.—He performed an advancement upon a boy who had just left another hospital, where he had been an in-patient for three weeks suffering from an angina. He was discharged as free from infection. The conjunctiva showed no abnormality. When the dressing was removed on the second day, the cornea was deeply infiltrated, and the site of the operation was covered by a dirty-grey mass. The whole cornea rapidly sloughed, and ultimately phthisis bulbi ensued. The pus was full of the *streptococcus longus*, which was also present in the opposite sac, and in the throat. The cocci produced no inflammation in the eye that was not operated upon, nor did the bouillon culture have any effect when some of it accidentally entered the author's own eye.

T. Harrison Butler.

(3) **Verderame** (Freiburg) records three cases, which show the results of this method of removing the deformity resulting from bone disease at the orbital margin. He gives an account of the various proceedings which have been adopted at different times in similar conditions, and dwells at considerable length on the dangers of injecting paraffin.

The *modus operandi* in this later method is somewhat as follows.—An incision is made parallel to the orbital margin at a convenient distance from the cicatrix, which is then carefully freed from the bone, by burrowing under the skin. A small disc, or oval, of fatty tissue is dissected from the abdominal wall under the skin. This should be slightly larger than is required, both in diameter and in thickness, so that the skin of the depressed area is raised a trifle above the level of the surrounding tissue. The graft is then placed in the recess by a sliding movement and the skin stitched over it. General anæsthesia is usually required.

The transplanted tissue is liable to shrivel a little in the course of a year or two. There is no record of the occurrence of fat embolism in the cases which have been done.

Four photographs of the author's cases are reproduced and indicate considerable improvement. LESLIE BUCHANAN.

(4) **Bettremieux** of Roubaix, states that the pathology of the eye is dominated by the fact that the blood after having served for the nutrition of the intra-ocular tissues must pass out through the sclerotic, and consequently stasis can easily be produced, giving rise to œdema, as in glaucoma, or to modifications of the media causing osmotic troubles and the production of exudates, as in retinal detachment. He claims that simple sclerectomy, without perforation of the sclerotic, relieves such congestion immediately by opening up the network of anastomosing vessels demonstrated by Henderson and permitting hæmorrhage from them, and ultimately by the formation of anastomoses between these deep sclerotic vessels and the subconjunctival vascular network. The action of the operation would therefore to a certain extent be comparable to that of Talma's operation or renal decortication.

The author records a case of glaucoma with daily attacks of misty vision in spite of the use of pilocarpine, in which the symptoms were relieved by a simple sclerectomy, and the eye remained in good condition twenty months after the operation, during the last eight of which no drops were used. And he refers to other similar cases. He has treated eight cases of detachment of the retina by simple sclerectomy, and claims to have obtained six re-attachments, one amelioration, and experienced one failure only. R. J. COULTER.

(5) **Alt** and **Sauer's** case was one of cyst of the nasal part of the orbit. An attempt was made by Alt to remove the cyst, but it proved so thin-walled and extended so far back that this was impossible. It was emptied of its viscid mucous contents and packed with gauze. No communication with the nose could be proved. The wound healed, but some months afterwards, the cavity refilled and the contents became purulent. The abscess was incised. A nasal exploration was made by Sauer who, only after repeated examinations, was able to establish the presence of pus coming from above the middle turbinate. A radical operation was then performed. The external wound was opened, a large amount of pus was evacuated and a communication with the posterior ethmoid cells was found. These cells were filled with granulations. The opening was enlarged; practically all of the orbital plate of the ethmoid was removed, and with it a portion of the middle turbinate. After this, the patient remained well, and a slight optic neuritis, which had existed, disappeared, leaving the eye with normal visual acuity.

ERNEST THOMSON.

(6) The method introduced by **Rollet**, of Lyons, consists (1) in making a horizontal incision through skin and orbicularis in the orbito-palpebral furrow, an incision down to the bone along the lower part of the eyebrow region, two divergent incisions from the extremities of the first incision towards the margin of the lid but not reaching to it, and a vertical incision from the middle of the first incision up to the eyebrow incision. (2) Dissecting up the lower and two side flaps thus formed, resecting a portion of the side flaps to prevent overlapping, and then carrying the lower flap upwards and, after paring its upper edge with the scissors, attaching it, muscle to muscle, with buried catgut sutures, and skin to skin with silkworm gut. By this open method the vertical fibres of the frontalis muscle can be recognised and a precise union made between them and the muscle fibres of the eyelid.

ERNEST THOMSON.

(7) **Franhe**, of Hamburg, describes and illustrates the various methods which he has found most useful in repairing defects in the eyelids left after the excision of malignant growths. If the loss of substance be small, a sliding operation is often sufficient, but large defects must be covered by pedunculated flaps and the conjunctiva replaced by mucous membrane from the lips.

The latter part of the communication deals with cases when after severe burns with lime and caustic, great shrinkage of the lids has taken place. This condition can be attacked either by introducing flaps of skin or by dissecting the tarsus free, and then finally covering it with skin grafts by Thiersch's method. At a late stage, a tarsorrhaphy is performed and the new lids are stitched over a shell or artificial eye, which is as large as possible. The author has by this means obtained a satisfactory result in three cases.

T. HARRISON BUTLER.

(8) In a case of paralytic ptosis, probably due to hæmorrhage, in a man aged 60 years, **Dor**, of Lyons, considered that it would be to the patient's advantage to have an operation which would raise the lid for the time being, and the effect of which could be nullified later, if the ptosis became cured medically.

The method adopted was to make two horizontal parallel incisions in the length of the lid, one near the eyebrow, the other a centimetre above the free edge of the lid. The two wounds thus made were united together, a roll of vaselined cotton first having been placed on the isthmus of skin between the incisions. The result was the union of the upper and lower middle thirds of the lid by a bridge of skin, which could readily be snipped through if required. The primary result was perfect; but, ultimately, the skin stretched and allowed the lid to droop partly. In doing the operation another time, Dor would not hesitate to make the two incisions wider, deeper, and further apart.

This short note is intended only to make a useful expedient more widely known.

ERNEST THOMSON.

(9) **Gaupillat** (Châlons-sur-Marne) finds that the difficult operation of dividing anterior synechiæ results in the diminution or disappearance of the astigmatism produced by a recent synechia, causes the cessation of sympathetic "accidents" if these exist—the author is referring especially to lacrymation and intolerance of light in the other eye—and disposes of the risk to the wounded eye of irritative or infective sequelæ.

ERNEST THOMSON.

(10) **Abadie** has long waited for a suitable case in which to ascertain whether or not his theory is correct, namely, that *excision* of the iris is not the essential point in the treatment of glaucoma, but *incision* and consequent division of the circular nervous plexus. In ordinary cases the *technique* of such simple divisions would be too difficult without pulling the iris out in order to divide it. Recently, a peculiar case occurred in which Abadie was able to do the operation

of incision with the iris *in situ*. The case was one of traumatic cataract in a child. The lens had become absorbed, and a dense capsular membrane, with a band of adhesion to the cornea, remained. In the endeavour to tear away this corneal adhesion, and to remove the capsular membrane, considerable force was used, and even this force failed to rupture the adhesion. It was then divided with scissors, and a black pupil was obtained. A few days afterwards, however, glaucomatous symptoms appeared, acute in character. Myotics had no effect. The case seemed favourable for simple division of the iris, the lens being absent. With a lance-knife an incision was made in the cornea, upwards and inwards. Through this, de Wecker's scissors were introduced, and the iris divided with one cut at the opposite side. A V-shaped opening resulted. As a result, the glaucomatous symptoms disappeared.

ERNEST THOMSON.

VI.—REMEDIES.

(1) Walter, O.—Bleno-lenicet and the treatment of blennorrhœa gonorrhoica (Das Bleno-Lenicet und die Behandlung der Blennorrhœa gonorrhoica.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 20 Januar, 1910.

(2) Wiegmann, E.—A contribution to the question of the clearing-up of lens opacities. (Ein Beitrag zur Frage der Aufhellung von Linsentrübungen.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 3 Februar, 1910.

(3) Hesse.—Eyebaths. (Augenbader.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 3 Februar, 1910.

(4) Sylla, Bruno.—Some therapeutic observations. (Einige therapeutische Beobachtungen.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 10, 17, u. 24 Februar and 3 März, 1910.

(5) Ewing, Arthur E.—A further report upon "A useful mild caustic": its employment in cancer and affections of the cornea. *American Journal of Ophthalmology*, May, 1910.

(6) Schanz, F. and Stockhausen, K.—On protecting the eyes against the harmful action of light of short wave length. (Schutz der Augen gegen die Schädigenden Wirkungen der kurzwelligen Lichtstrahlen.) *Zeitschrift für Augenheilkunde*, Mai, 1910.

(7) Yvert.—Paraspecific or polyvalent applications of antidiphtheritic serum in ophthalmology. (Les applications paraspécifiques ou polyvalentes du sérum antidiphthéritique à l'oculistique.) *Recueil d'Ophtalmologie*, mai, 1910.

(8) Brown, Samuel Horton.—Dionin in corneal opacities. *American Journal of Ophthalmology*, June, 1910.

(9) Daxenberger, F.—Collargol in the treatment of eye diseases. (Collargol in der Augenheilkunde.) *Wochenschrift f. Therapie u. Hygiene des Auges*, 23 Juni, 1910.

(10) Thillier.—The treatment of profuse vitreous hæmorrhages by fibrolysin. *La Clinique Ophtalmologique*, 10 juillet, 1910.

(11) **Houdart.** Intravenous injections. *La Clinique Ophtalmologique*, 10 août, 1910.

(12) **Dor, Louis.** —The treatment of retinal detachment by tuberculin. *La Clinique Ophtalmologique*, 10 août, 1910.

(13) **Smith, Henry, Lt.-Col., I.M.S.**—Sub-conjunctival injections of cyanide of mercury in trachomatous conditions. *Indian Medical Gazette*, XLL, 295, August, 1910.

(1) **Walter,** of Odessa, gives an account of his experience with bleno-lenicet, the ointment recommended by Adam to be introduced every two hours in cases of gonorrhœal ophthalmia (THE OPHTHALMOSCOPE, 1909, page 867). In his first two cases, young girls of two years of age, bleno-lenicet was substituted for nitrate of silver after the purulent discharge had ceased, and it recurred until the silver was again resumed. In the third case the two methods of treatment were combined. The swelling of the lids and the secretion disappeared; but on the eighth day the cornea became affected, and the child was taken elsewhere for treatment. The combined treatment was adopted in ten other cases, all being under twenty years of age except one. The left cornea suppurated in a girl of nineteen: but it had become infiltrated prior to treatment. The remaining nine showed no involvement of the cornea; and the author believes bleno-lenicet acts as a preventive if given while the cornea is still intact. The ointment should not be ordered for home-use. W. B. INGLIS POLLOCK.

(2) **Wiegmann,** of Hildesheim, relates the case of a young man of 19 with chronic uveitis and vitreous opacities followed by peripheral striæ in the lens. Under a vigorous course of mercury, the vision returned to normal and the lental opacities cleared up almost as completely as those in the vitreous.
W. B. INGLIS POLLOCK.

(3) **Hesse,** of Pirna, recommends the extensive use of the eyebath for all external diseases of the eye, and more particularly for corneal affections. The lotion should consist of a lukewarm solution of artificial Emser salt and biborate of soda or borax. He claims that the frequent and free application keeps the eyes clean, promotes the lymph circulation, and has a special effect on bacteria. The eyebath is certainly the most convenient method for all who are in the public service or who are in any way prevented from returning home during the day. W. B. INGLIS POLLOCK.

(4) **Sylla,** of Bremen, communicates the results of his experience with several of the more recent therapeutic agents in a short series of interesting papers.

Perhydrol in a solution of 2 or 3 per cent., applied once or twice to the conjunctival sac in the conjunctivitis Meibomiana recently described by Elschnig, decreases the bluish-red congestion and diminishes the swelling. A number of yellow spots and white particles then become apparent situated at different levels and more abundant in the fornix and around the glands. The author regards the former as small abscesses and the latter as calcareous deposits. While performing iridectomy for buphthalmos in a syphilitic infant of eight months, who had also a central leucoma resulting from ophthalmia neonatorum with ulcer, a yellow mucoid mass presented in the coloboma. Powdered ethylmorphiniodide and iodoform were dusted on the wound, and a bandage was applied. Atropin on the third day after the operation produced hyphæma and increased tension, which was relieved by eserine and a second application of ethylmorphiniodide. In the third paper Sylla discusses eucerin and cetosan as a basis for ointments. For the ophthalmia when conjunctivitis in children is accompanied

by scrofulous disease of the nose he places the child on its back and introduces a large quantity of 10 per cent. lenicet-eucerinum anhydricum into the nostrils which is retained by a plug of cotton wool for half an hour while the child lies on the back the whole time. This is repeated daily, and as improvement sets in, the lenicet is reduced to 5 per cent. For eyes with excessive lacrymation he prefers 5 or 10 per cent. protargol in eucerinum anhydricum ointment. For dry scaly blepharitis he employs the yellow or white oxide of mercury with cetosan as ointment basis.

To obtain thorough diaphoresis in cases of iritis, the following procedure is recommended, at least eight hours after the first introduction of atropine. At 6 p.m. the patient takes a 1 gramme diaspirin tablet, with a large glass of hot water. At 7.30 a hot foot-bath for 10-15 minutes is given during which a second diaspirin tablet is taken and two cupfuls of hot elder tea are drunk. He then retires to bed clothed in a woollen garment, and should perspiration not begin within half an hour, a third tablet is taken, with a cupful of hot elder tea. Diaphoresis continues for 75 minutes or so, and after cooling for five minutes, the patient rises and is sponged down with warm water. A light supper in bed follows. Half to one hour later, three drops of atropine and cocaine are instilled into the eye, which is then covered with a warm compress. The procedure may be repeated two evenings later and each fifth or sixth evening afterwards. Given in a similar manner, aspirin is said to disturb the heart and to cause pains in the stomach, symptoms which do not occur with the diaspirin.

The concluding paper is given up to a comparison of dionin and ethylmorphin iodide. The effect of the former is more intense and extensive, since it may lead to swelling of the eyelids, and as this does not occur with the latter, it is recommended for the consulting-room. The power of causing absorption is about equal, while the latter produces less pain. Tolerance is established equally for both. It is therefore advised to commence with the ethymorphin iodide and then to employ the stronger dionin, and when this loses its effect, allow an interval of eight to ten days before commencing the same routine again. For wounds and ulcers of the cornea, the author uses a combination of powdered iodoform and ethylmorphin iodide from the commencement of the treatment, as he believes less scarring is left. W. B. INGLIS POLLOCK.

(5) In THE OPHTHALMOSCOPE for March, 1910, page 236, will be found an abstract of **Ewing's** first article on the use of a combination of resorcin and salicylic acid as a mild caustic. The formulæ for the "weak" and "strong" applications were given in the abstract.

Ewing now comes forward with further experience of the combination in cases of cancer in parts other than the eye, and in cases of hypopyon-keratitis. Used in desperate cases of inoperable cancer, the solution had a beneficial cleansing and deodorizing action. Three cases of hypopyon-keratitis were treated. In these the ulcer involved more than half the cornea and eventually perforated. By the use of the solution in two of these cases "a very good cornea" was saved, and the third is well on the way to recovery. Finally, the solution was used on "an old thickened, tough, corneal staphyloma which protruded between the lids." The solution was used daily for three days, on the fifth day the staphyloma was entirely destroyed, leaving a fairly good cornea of nearly normal curvature. There was no perceptible conjunctival reaction. ERNEST THOMSON.

(6) The photographs of spectra which accompany this paper by **Schanz** and **Stockhausen**, of Dresden, demonstrate at a glance the character of the light emitted from various sources of illumination. The spectrum of an arc lamp unshaded by a glass shews that the ultra-violet rays form a band which is at

least three times as long as the visible part of the spectrum, extending from 400 mm. to under 200 mm. The ultra-violet portion obtained from daylight is not nearly as long as this, but if the spectroscope be exposed upon a high mountain, the two spectra show a close approximation. A candle or paraffin lamp emits few ultra-violet rays and is the most suitable light for reading. The gas mantle light emits ultra-violet rays up to 300 mm., a band about as long as a visible spectrum. The spectrum from the incandescent electric lamp is equally rich in ultra-violet rays. The effect of a shade in absorbing these short wave length rays is well demonstrated, and it is rendered obvious that "Euphos" glass absorbs them almost entirely. Another plate graphically shews the absorptive power for ultra-violet rays of the human cornea and lens. The lens is quite as effective a light filter as "Euphos" glass. The authors attempt to explain how the ultra-violet rays act upon the eye. It is well known that both the retina and the lens, but especially the latter, fluoresce in ultra-violet light. The lens absorb these rays, fluoresces, and transforms many of them into light of longer wave length. The older the lens the greater is its absorptive power. Widmark and Hesse, by exposing lenses to long continued and excessive illumination by light rich in ultra-violet rays, have succeeded in demonstrating changes in the capsule epithelium. Other experimenters have by the same means caused diffuse haze of the lens. It has been shown that the light emitted from molten glass which causes glass blower's cataract is free from those rays which affect the skin, but is very rich in rays of the wave length which cause fluorescence of the lens, and it is these rays which cause cataract. The authors believe that the power of the lens to absorb ultra-violet rays may exert a deleterious influence upon the capsule cells when the light is intense or acts for too long a period.

The paper shows that in "Euphos" glass we possess an almost perfect light filter for the harmful ultra-violet rays. This glass is now a commercial product, and is made in two qualities, A and B. The A brand partially filters out the ultra-violet rays, and is useful for persons who are much in ordinary open air. The B brand completely filters the rays, and is applicable for mountain and arctic travel, for glass blowers, and for aphakic persons. There are also five grades of smoked "Euphos" glass which entirely absorb the ultra-violet, and also diminish the intensity of the illumination.

T. Harrison Butler.

(8) **Yvert**, of Dijon, gives Darier due credit for his enthusiastic advocacy of paraspecific serotherapy in ophthalmology. He finds antidiphtheritic serum the most convenient to use, although human, horse, goat, or rabbit serum might safely be used if at hand and very carefully prepared.

Yvert finds antidiphtheritic serum of immense value in the treatment of acute infective iritis and iridocyclitis, whether due to rheumatism, tubercle, syphilis, or traumatism. It reduces the pain and inflammatory phenomena with extraordinary rapidity, and gives the patient a feeling of well-being which is favourable to his recovery. In infective ulcers of the cornea it may be used alone in the first stage, but in the second and third stages it is necessary to combine with it the usual topical and surgical measures. This is also necessary in large infected wounds of the cornea and sclerotic, and infections of the vitreous and hyalitis due to purulent choroiditis. Darier has not had a single case of sympathetic ophthalmia since he has used antidiphtheritic serum systematically.

Yvert quotes a case (of Berards') of traumatic iridocyclitis with infection of the vitreous, in which ordinary methods, including subconjunctival injections of cyanide of mercury and chloride of sodium, had no influence, and in which after an injection of 20 cc. of Roux's serum the symptoms immediately

abated, and after repetition of the injections on two succesive days, the patient recovered with V.=$\frac{1}{3}$ six days after the first injection.

For post-operative infections serotherapy is now regarded by many authorities as the most efficient means of preventing disaster.

The serum may be administered by intravenous injections, by hypodermic injection, by subconjunctival injections, by the mouth, or by direct application to a bleeding spot.

The effects are apparent in one hour after intravenous injection, in 3 to 5 hours after hypodermic injection, and in 6 to 8 hours after oral administration.

Hitherto, the subcutaneous method has been generally adopted, and 20 to 40 cc. are injected, according to the age of the patient.

Intravenously, 10 to 20 cc. forms a moderate dose. Subconjunctivally, 1 or 2 cc. are given along with hypodermic injections or administration of the serum by the mouth. The subconjunctival method is specially adapted as a preventive and curative method in traumatic or operative injections.

The oral method, owing to its simplicity and efficacy, is now largely replacing the other methods. It never produces serious rashes or other troubles, even when given daily for ten or twelve days. It may be given in doses of 10 cc. of the fresh horse serum in milk (Hort), and repeated daily if necessary. Darier recommends tablespoonful doses every hour of the following: —

Roux's Serum, 10 . cc.
Normal Salt Solution (·7 %) 110 grammes.

As symptoms subside, the same quantity is given every two hours.

Some English authorities recommend the administration of a mixture of the serum with a few drops of opium and a saturated solution of salol in chloroform, and half an hour before the patient is to drink a glassful of 1 per cent. solution of bicarbonate of soda. These precautions are hardly necessary, since the methods of Hort or Darier give excellent results.

J. Jameson Evans.

(8) Many of us have employed dionin in the endeavour to clear up corneal opacities, and have been doubtful whether the drug was very efficacious.

Horton Brown, of Philadelphia, now publishes a case which shows that sometimes, at least, the result is very positive.—The patient was a woman of 28 years who, eighteen years previously had had a corneal inflammation. There were now in both eyes, pronounced, apparently superficial, opacities of the cornea; the right cornea was more affected than the left. The patient was ordered five per cent. dionin drops twice daily in the right eye. At the end of ten days the visual acuity (which the author does not state for the period before commencing treatment) was R.$\frac{5}{2\frac{5}{2.5}}$, L.$\frac{5}{6\frac{5}{6}}$. In another month of treatment R.$\frac{5}{1\frac{5}{2}}$, L.$\frac{5}{4\frac{5}{5}}$. The dionin was discontinued in the right, and employed in the left eye twice daily. After two weeks, V.R.= $\frac{5}{1\frac{5}{2}}$? V.L.= $\frac{5}{2\frac{5}{6}}$. Two weeks later again V.R.= $\frac{5}{9}$? L.= $\frac{5}{9}$? and has remained at that.

Ernest Thomson.

(9) **Daxenberger** (Regensburg) describes a case of ulcus serpens in which, in spite of treatment, a half of the cornea was destroyed and hypopyon had almost filled the anterior chamber when collargol was given a trial prior to the use of the cautery. Rapid improvement set in and the vision, after completion of the treatment, reached $\frac{6}{12}$. Injection into the anterior chamber of a 1-2 per cent. solution is recommended after evacuation of hypopyon and also into the vitreous in cases of panophthalmitis. Collargol is further advised for ophthalmia neonatorum, various forms of conjunctivitis, and dacryocystitis. The antiseptic action of the drug is attributed to the 75 per cent. of silver contained in it. Argyrosis should not appear with reasonable

use, but that statement seems true of most of the silver preparations. The author states, in addition, that it does not cause burning when dropped into the eye. W. B. Inglis Pollock.

(10) In the case of a woman of 26 years whose right eye was blind from optic atrophy, **Thillier** was consulted on account of failure of vision of the left eye. Numerous round and flame-shaped retinal hæmorrhages were found. A careful examination of the patient by a physician revealed no probable cause. Taking into consideration the atrophy of the right optic nerve, the patient was put upon mercurials with markedly beneficial effect at the time. But the condition relapsed repeatedly, until eventually the vision was reduced to vague perception of large objects, and the media were completely blocked. At this point the patient was first treated with fibrolysin, receiving 2 c.c. of 0·10 per cent. fibrolysin (Clin) in the gluteal muscles. The results were brilliant, for in two days the patient's vision greatly improved. A second injection after four days enabled her to tell the time on a watch. After ten injections altogether given three times in the week, vision was $\frac{1}{6}$, and the interior of the eye could be examined. The ophthalmoscopic examination revealed large flocculi in the vitreous, retinitis proliferans, a hazy disc, narrow vessels, "in fact an ocular fundus on the road to disorganization." The injections were continued at longer intervals and although relapses took place, V.A. at one time reached $\frac{2}{3}$, fell off to $\frac{1}{6}$, and remounted after further treatment to $\frac{1}{2}$. At this point the case-history ends, the author remarking, "What the future will be I do not know."

The rest of the article is concerned with the use of fibrolysin in general and with speculations as to its mode of action. Ernest Thomson.

(11) This paper by **Houdart**, of Brest, on the treatment of syphilis by intravenous injections of mercury—preferably the cyanide—is somewhat discursive and at points difficult to follow and to understand exactly. The subject is one of general importance, and the readers of The Ophthalmoscope will do well to consult the original. Ernest Thomson.

(12) **Louis Dor**, of Lyons, has noticed the frequency of tuberculous affections among patients with retinal detachment. Detachment appears to him in certain cases to be an ocular localization of a general process, and he puts the question whether, in patients who have no previous history of tubercle, the detachment may not be considered as an initial and isolated manifestation thereof.

According to Leber and Deutschmann, detachment is secondary to retraction of the vitreous, and the vitreous is a non-vascularized tissue. Now is it not characteristic of tubercle that it tends to affect badly vascularized, or non-vascularized tissues, tendons, aponeuroses, serous membranes, cartilages? It will be objected that retraction of the vitreous is a lesion of myopic eyes and has nothing to do with tubercle. But, says Dor, myopia only accounts for 80 per cent. of cases (Deutschmann), and in any case may it not be possible that tubercle affects by preference the vitreous of the long eye of myopia? Does it not affect by preference bones which grow too rapidly? It may also be objected that traumatism plays a part in detachment and that this has nothing to do with tubercle. But, against this view, must we not recollect that traumatism often leads up to tuberculosis of organs?

In any case theoretical discussion must bow before clinical facts. Five times in two years Dor has treated detachment with tuberculin, and although tuberculin was not the only treatment employed—subconjunctival injections of sea water having been given in addition—the fact that three cases were definitely cured, while one had reattachment followed by relapse, points to the

preponderating part played by the tuberculin. Can anybody obtain re-attachment four times out of five by subconjunctival injections alone?

The case histories and the treatment are not given in detail by Dor. It may suffice to summarize:—Cases I and II were myopes. Case I is stated to be tuberculous. These two became cured right off. Case III was a myope of 20 D. He was cured, but had a relapse owing to too early return to work. Case IV was "a young woman of 40 years," hypermetropic 3 D, double detachment, with family history of tubercle and personal history of tuberculous iritis. There were two relapses in the course of treatment, but ultimately reattachment took place in both eyes. Case V did not respond at all to the treatment.

As regards duration of the cure, analysis of the cases shows—I. Sixteen months. II. Eleven months to date of publication above. III. Four months, then relapse, subsequent treatment not stated. IV. Four months.

The author finishes with the statement that even in the case where there was no therapeutic result, each injection of tuberculin always caused photopsia, which is evidence of its influence upon the detached retina.

ERNEST THOMSON.

(13) At the Bombay Medical Congress early in 1909, **Smith**, of Amritsar, India, recommended sub-conjunctival injections of cyanide of mercury in the treatment of trachomatous pannus and corneal ulcers.

He has since found that the effect of the injections extends to the palpebral conjunctiva, and he regards the injections as incomparably the best means of treating trachoma. Twenty minims of 1 in 4000 cyanide solution are introduced beneath the upper part of the bulbar conjunctiva. The fluid quickly finds its way from there to produce chemosis around the whole of the cornea. Ten per cent. cocaine solution is used beforehand for instillation, and a hypodermic of morphia is needed to relieve the pain, which is otherwise severe for three hours. The swelling of the lids and of their conjunctiva is then complete; it subsides in seven days. If a second injection is required, it is given six days after the first, as it is difficult to get the fluid inserted properly until after the complete subsidence of the conjunctival œdema. Subsequent injections are given at similar intervals. Three or four injections are "generally enough for the most obstinate cases of trachoma or pannus, whether the latter be trachomatous or not." Apparently, the conjunctiva, becomes fixed to the sclerotic by fibrosis even after one injection. One would like to know something of the condition in this respect produced by repeated injections.

H. HERBERT.

BOOK NOTICES.

Transactions of the Optical Society, 1907-8 and 1908-9.

We have received copies of the *Transactions* of the Optical Society London, for 1907-8 and 1908-9. Many of the articles in these volumes are by well-known men of science. Some of them are of special interest to the ophthalmic surgeon and to the optician, while others may be said to be of general interest. The names of Professor Tscherning, G. T. Beilby, R. T. Glazebrook, Professor Burch, and others are indicative of the high standard aimed at.

Diseases of the Eyes in Infancy. (Die Erkrankung des Auges im Kindesalter.) Von Dr. ALBERT PETERS. (Rostock). Bonn: Verlag von Friedrich Cohen. 1910. Price 6 Marks.

We have read this excellent book from beginning to end with great interest. Professor Peters has treated his subject from the broadest pathological standpoint, and has studied to inculcate the principles of ocular disease rather than to draw attention to minutiæ. There are no diagrams, no illustrations, and no plates. The methods of examination are not touched upon. Anatomical details, microscopical histology, and dioptrics find no place in the book. The first chapter deals with disease of the conjunctiva. The subject is treated chiefly from the bacteriological side, and all the most recent work is noticed. The pages devoted to trachoma are excellent, but the author is evidently not acquainted with the acute forms seen in the East or he would not state that complications, such as trichiasis, are rarely seen in infants. We have unfortunately operated upon several children as young as three years for severe entropion and trichiasis. The theory that trachoma is caused by the cell inclusions of v. Prowazek and Halberstädter is judicially discussed and is held to be so far non-proven. As the author points out, the same bodies are found in ophthalmia neonatorum, in conjunctivitis siccai, and in vernal catarrh. Herzog's work, in which he attempts to shew that these cell inclusions are really metamorphs of the gonococcus, are in fact microgonococci, had not appeared when this book was published Peters does not think that follicular conjunctivitis exists as a definite pathological entity, but follicles may appear under a variety of conditions, such as when lice are found in the hair, as pointed out by Bishop Harman.

The second chapter describes corneal ulcers. It is short; for ulcers in children do not present the many varieties seen in adults and are best classified according to the micro-organisms which give rise to them. Peters has seen no amelioration follow the use of Römer's specific pneumococcal serum, and here most ophthalmic surgeons will agree with him. He mentions Deutschmann's serum from yeast-fed rabbits as having been recommended, but we gather that he has not himself tried it.

The next chapters are devoted to diseases of the lids and the lens, and are good and full of practical experience.

The sixth chapter on tuberculosis of the juvenile eye is one of the very best in the book. For many years v. Michael has been publishing work showing how very common tuberculous disease of the eye really is, but it is only recently that his views have been accepted by surgeons in general; but at last the tide has turned, and this chapter comes at the psychological moment when our minds are ready to accept the new teaching. It should be read by all surgeons who wish to master the most recent views on tuberculous processes in the infant eye. The author, however, fails to describe obsolescent tuberculous disease of the macular region, a not uncommon condition which was carefully characterised some years ago by Sydney Stephenson.

On page 161 there is a dangerous misprint. The dose of old tuberculine for subcutaneous injection is given as 1—5 g. Surely this should be 1—5 m.g. A dose of 5 grammes would be enormous! There is one other important misprint in the book. On page 85 instead of stating that yellow oxide ointment is made from Hydrarg. Oxid. *flav.* the red oxide is given—Hydrarg. oxid. *rubr.* The red oxide causes intense irritation of the eye, as we learned to our cost, when the mistake was made by a dispenser.

The later chapters upon errors of refraction, strabismus, and heterophoria are not so good as those we have referred to. A very inadequate account is given of nystagmus with head-nodding. We cannot agree that a child's accommodation can be paralysed by $\frac{1}{2}$ per cent. solution of homatropine.

Even in adolescents it sometimes fails, while in children it is never trustworthy. Peters says that the hypermetropic eye is not more disposed to glaucoma than the emmetropic eye. This may be correct but the opposite is generally taught. The author apparently places great reliance upon the ophthalmometer of Javal-Shiötz, which, he says, rapidly gives the amount and the angle of the astigmatism. Our personal experience of the instrument is small, but we have found it quite unreliable both as regards the degree and the angle of astigmatism. One of the ablest refractionists we know tells us that it is a scientific toy, of no practical value to an ophthalmic surgeon. Peters does not sufficiently impress the fact that accurate retinoscopy is the *alpha* and *omega* of refraction among children. These criticisms apply to most German works. German oculists have, or had until recently, considerable contempt for accurate refraction, a subject which has been brought to its present pitch of perfection in America and England.

We congratulate Professor Peters upon having supplied a want and produced a most valuable book. T. HARRISON BUTLER.

Researches into the Anatomy and Physiology of the Ciliary Region of the Retina. (Recherches sur l'Anatomie et la Physiologie de la Région Ciliaire de la Rètine.) Par JACQUES MAWAS. Lyon: A. Rev

The monograph of Mawas extends to 120 pages of good clear type, and is illustrated with two plates containing eleven figures, and two figures in the text. The book may be said to concern two main points—namely, the origin of the aqueous, and the origin of the fibres of the zonula. It contains a great number of statements of what the author has seen and therefore considers as absolute facts, and a considerable number of statements to the effect that what others have seen and believed to be facts are in reality illusions. But such is the nature of controversy!

Following an introduction bearing in general upon the pars ciliaris retinæ the work is divided into three chapters.—I. A short anatomical description of the pars ciliaris retinæ; II. An historical account of our knowledge of the constitution and meaning of the pars ciliaris retinæ and of the fibres of the zonule of Zinn; and III. Personal observations. After these three chapters, come nine paragraphs of conclusions.

The reviewer, although he has read the book with great interest, does not feel justified either in giving the author's arguments or quoting his conclusions in full. He will be content to epitomise what seem to be the more important points:

(1) The inner or unpigmented layer of the pars ciliaris retinæ represents the whole of the retina except the pigment layer, which latter is here represented by the outer pigmented cells.

(2) The outgrowths of the pigmented layer which have been described by E. T. Collins and others as special glands secreting the aqueous, are nothing of the sort. They do not open into the posterior chamber, since they are covered always by the layer of unpigmented epithelium, and the epithelium of these pseudo-glands does not differ from that of the rest of the pigmented layer. Buchanan has been at pains to demonstrate their existence, but has failed to show that they are glandular. Doubtless, the pigment cell is a secretory cell, but if it has a share in the production of the aqueous it is not such a share as is meant by Collins and Buchanan. Further, these outgrowths do not occur in other animals. In short, there are no ciliary glands which secrete the aqueous, the opinion of Collins and of Buchanan notwithstanding.

(3) A patient investigation of the unpigmented layer with various fixatives

and methods of staining (the details of which are fully given) and of the composition of the aqueous humour has convinced the author that the aqueous humour is not like lymph, is not any sort of exudate from the vessels of the ciliary body, but is an actual secretion by the non-pigmented layer of the pars ciliaris retinæ

(4) With regard to the fibres of the zonule, the author has completely satisfied himself that these have no connection with the vitreous. Neither the internal nor the external limiting membrane of the ciliary part of the retina is really a membrane in any proper sense. They are "exoplastic formations" of the layer of unpigmented cells. They are formed by aggregations of the thickened protoplasmic cortex of these cells, and the fibres of the zonule, which arise always from the unpigmented layer of the pars ciliaris, take their origin from, and are of the same nature as, these "exoplastic formations" which, if the reviewer understands the author aright, exist all round the cells of the unpigmented epithelium. The fibres of the zonule are not merely applied to the limitans interna; they are certainly not protoplasmic prolongations of the cells themselves; but are derived from and really form part of the "exoplastic formations" between the cells, and as far outwards as the limitans externa The pigmented layer has nothing to do with their formation. Further, the fibres of the zonule arise from the whole surface of the pars ciliaris, that is to say from the crests of the ciliary processes and from the hollows between them. Finally, the fibres of the zonule do not give the reactions exclusively of connective tissue, elastic tissue, or of neuroglia; they are not to be considered as of the nature of any of these, nor as fibres of Müller, which, indeed, they do not resemble at all.

A considerable bibliography, arranged alphabetically and with the year of publication in the margin, accompanies this interesting volume.

ERNEST THOMSON.

NOTES AND ECHOES.

Deaths.

WE regret to announce the death, shortly after a surgical operation for nasal obstruction, of Henry Collen Ensor, which took place at Cardiff, on August 23rd last, at the age of 51 years. Mr. Ensor, who was the son of a Cardiff solicitor, received his medical education at Guy's Hospital, London, where he held the post of ophthalmic clinical assistant. He took the diplomas of M.R.C.S. and L.S.A. in the year 1885. After he had spent a term as resident surgical officer of the Birmingham and Midland Eye Hospital, Mr. Ensor settled in Cardiff, where he succeeded Dr. Tatham Thompson as ophthalmic surgeon to the Cardiff Infirmary. He became a member of the Ophthalmological Society in 1887. At the time of his demise Mr. Ensor also held the appointments of ophthalmic surgeon to the Cardiff Provident Dispensary and to the Deaf and Dumb Institution. He was consulting ophthalmic surgeon to Mountain Ash Hospital and to the Royal Hamadryad Seamen's Hospital, Cardiff. He had a distinguished career in Freemasonry, having been a Past Master of the Bute Lodge and Past Z of the George Elliott Chapter of the Royal Arch Freemasons. He leaves a widow and three children to mourn his untimely and somewhat tragic death.

A figure well known in London some twenty years ago has passed away at Pontresina, Engadine, in the person of Benjamin Wainewright, at the age of 57 years. Mr. Wainewright died suddenly of heart failure. Mr. Wainewright

was formerly assistant surgeon to the Royal Westminster Ophthalmic Hospital, and held besides appointments at the Charing Cross Hospital and at the West London Hospital. Being blessed with this world's goods, Mr. Wainewright retired from the active practice of medicine some years ago, and on that account did not attain the distinguished position to which his talents and early promise entitled him.

Joseph Nelson died at Belfast on August 31st last in his seventieth year. Death resulted from a growth in the abdominal cavity. His career had been an adventurous one. The son of a Unitarian minister at Downpatrick,

Nelson joined Garibaldi in 1860 at Genoa, and took part in several engagements against King Bomba. He was given a commission in the *Regimento Inglese*, was presented with a sword by Garibaldi, and was afterwards decorated by the King of Italy. After graduating M.D. in 1863 at Queen's University, Nelson went to India, where he engaged mainly in commercial pursuits. But in 1878 he returned to his own country and took up

eye work, which he had studied in Vienna under F. R. von Arlt and Ernst Fuchs. In 1882 he was appointed ophthalmic surgeon to the old Belfast Royal Hospital, as well as to the Belfast Hospital for Sick Children. Nelson was an original member of the Ophthalmological Society of the United Kingdom, and at the time of his death was a vice-president of that body. He was an ex-president of the Ulster Medical Society. His contributions included one dealing with "Tobacco Amblyopia" published in the *British Medical Journal* of 1880. Nelson, who possessed a most breezy and attractive personality, leaves a widow and five children. His hearty laugh and kindly face will be sorely missed.

For the following we have to thank Professor G. Stanculeanu, of Bucharest :

We regret to announce the death of Professor N. Manolesco, late of Bucharest, which occurred suddenly on the 4th September last, owing to heart failure. Manolesco was born in 1850, and took his medical degree in the University at Bucharest. Afterwards, he went to Paris, where he spent some time as de Wecker's assistant, after which he worked in Vienna under Arlt. On his return to his native country in 1881, he was appointed professor of ophthalmology and chief surgeon of the Eye Hospital in Bucharest. He was a skilful operator, and devised several new methods for the removal of cataract. His principal discovery, however, was the abrasion of the conjunctiva with a tooth-brush in the treatment of trachoma, which is a very satisfactory method for curing this disease. Manolesco's death is a great loss to ophthalmology in general, and to Roumania in particular.

The death is announced of Dr. Charles A. S. Dalgleish, a well-known eye specialist and formerly surgeon to Sunderland and Durham County Eye Infirmary. He was a student of Durham and Oxford, graduating in 1890. Two years later he qualified as a doctor of medicine at Durham. He acted successively as house physician of the Royal Infirmary, Newcastle-on-Tyne, junior and senior resident medical officer of the Radcliffe Infirmary, Oxford, senior house physician of the General Infirmary, Leeds, and house surgeon of the Eye Hospital, Oxford.

We have several deaths to deplore from the other side of the Atlantic.

Dr. A. W. Calhoun, of Atlanta, Ga. has succumbed after a prolonged period of ill-health, borne with the greatest fortitude. He was a prominent ophthalmic surgeon in the Southern States of America, and was professor of ophthalmology in the Atlanta College of Physicians and Surgeons. For many years he was a valued collaborator on the staff of *The Ophthalmic Record*, and a sympathetic reference to his death will be found in the columns of our contemporary. At a recent meeting of the Board of Trustees and the Faculty of Atlanta College, it was determined to set aside a page in the archives of the college to be inscribed to Dr. Calhoun's memory.

We have also to record the death of F. Gurney Stubbs, prominent among the younger ophthalmic surgeons of Chicago.

* * * *

Appointments

Dr. W. Stock, of Freiburg, has been appointed to the chair of ophthalmology in the University of Jena, in succession to Dr. Wagenmann.

Dr. Friedrich Dimmer, of Gratz, has accepted the chair of ophthalmology at Vienna (which he had at first declined) in succession to J. Schnabel, deceased.

Dr. F. Francaviglia has been promoted to the professorship of ophthalmology in the University of Catania.

Dr. Gustav Ahlström has been appointed professor of ophthalmology at the University of Lund in succession to Dr. Dalén.

Dr. Guiseppe Ovio has been promoted to the ordinary professorship of ophthalmology in the University of Modena.

Dr. Samuel Éperon has been nominated professor of ophthalmology and director of the *Augenklinik* at Lausanne.

The following appointments have been made to the staff of the Bristol Eye Dispensary:—Edward H. E. Stack, surgeon; William P. Taylor, Harold B. Porteous, and Arthur Fells, assistant surgeons.

The following *privat-dozenten* have been recognised:—C. Baslini and C. Genari at Pavia; W. Gilbert at Munich; Francesco Motolese at Florence; Ernesto Paltacca at Palermo; and v. Szilli at Freiburg.

Dr. G. A. Berry has been appointed a medical referee under the Workmen's Compensation Act of 1906 for the Sheriffdom of the Lothians and Peebles for ophthalmic cases.

Mr. Clements Hailes has been appointed honorary consulting ophthalmic surgeon to the Bristol Eye Hospital.

Dr. W. McCready has been elected ophthalmic surgeon to the Belfast Hospital for Sick Children in place of the late Joseph Nelson.

The following gentlemen have been appointed examiners in ophthalmic surgery for the fellowship of the Royal College of Surgeons of Edinburgh:—George A. Berry, George Mackay, William George Sym, and James Veitch Paterson.

Dr. A. Ogilvy has been appointed surgeon to the Bristol Eye Hospital.

Dr. E. Magennis and Dr. R. J. Montgomery have been appointed examiners in ophthalmology at the Apothecaries' Hall of Ireland.

Dr. F. E. Burch has been appointed assistant professor of ophthalmology and otology in the University of Minnesota College of Medicine and Surgery.

Among minor appointments may be mentioned those of W. Victor Corbett as senior ophthalmic house surgeon to St. Thomas's Hospital, London, and of J. P. Lupton as junior ophthalmic house surgeon to the same institution.

* * * *

Honours.

The title of professor has been granted to Dr. Karl Wessely, *privat-dozent* of ophthalmology in the University of Wurzburg. A similar distinction has been conferred upon Dr. Baiardi at Genoa.

To Dr. Gaetano Lodato has been granted the title of extraordinary professor of ophthalmology at Palermo.

* * * *

Dr. Krönlein.

OPHTHALMIC surgeons will regret to learn that Dr. Krönlein is about to resign the chair of surgery at the University of Zurich.

* * * *

American Academy of Ophthalmology and Oto-Laryngology.

THE anniversary address of the Academy was delivered on September 19th last at Cincinnati, Ohio, by Mr. Sydney Stephenson, of London, who selected as his theme "Keratomalacia." The lecture will be found elsewhere in the present issue of THE OPHTHALMOSCOPE. On the conclusion of the address Mr. Stephenson was presented with the honorary fellowship of the Academy, a suitably inscribed gold medal, and a substantial cheque.

At the same meeting the following appointments were made:—President. Dr. J. J. Kyle. Vice-presidents, Drs. F. Park Lewis, S. Iglauer, and Shirley, Treasurer, Dr. S. H. Large. Secretary, Dr. G. F. Suker.

* * * *

Sight Testing in Merchant Ships.

WE are far from having arrived at the last word to be said, or steps to be taken, as to eyesight in the Mercantile Navy. The standard is to be raised in 1914; by that time we hope our knowledge on the subject will be further advanced.—*Shipping World.*

* * * *

Epidemic Trachoma in England.

OWING to a severe epidemic of trachoma which has broken out at the Gordon Boys' Orphanage at Dover a specialist has had to be consulted, and additional premises hired to isolate the boys, and an appeal is made to the charitable to defray the extra expenditure, which will total between £300 and £400.

* * * *

The endowment of Opto-Technics.

THE London County Council, through its education offices, has recently issued a circular letter to various members of the optical trade in London enquiring as to the advisability of equipping and endowing an institute of technical optics in connection with the Northampton Polytechnic Institute in Clerkenwell. The proposed building is to comprise a basement and five floors, and will be equipped (if the scheme be approved by the Council) with glass and metal furnaces, workshop for spectacle frames, laboratories of various kinds, and various departments connected with telescopes, chronometers, meteorological instruments, projection apparatus, photography, and so

forth. The second floor of the proposed building, we read, includes the department of physiological optics, as well as a room for the practical histology of the eye, and a special room for testing, with dark room adjoining. The estimated cost of the building is £30,000.

* * * *

Sight Tests.

A report on the sight tests used in the mercantile marine which has been issued as a Parliamentary Paper, states that during 1909 the total number of candidates examined was 6,084. Of these, 6,028 candidates passed in form vision, and 56 failed. 5,942 candidates were successful in the colour vision tests, and 86 failed; 15 of the latter passed on appeal. No case of failure to pass the colour-ignorance test has been reported. The Board of Trade have decided that after January 1, 1914, the standard of form vision shall be raised, so that candidates will thereafter be required to possess full normal vision in one eye and at least half-normal vision in the other.—"Sight Tests." Cd. 5256. Price 3d.—*The Hospital.*

THE

OPHTHALMOSCOPE.

A MONTHLY REVIEW OF CURRENT OPHTHALMOLOGY.

VOL. VIII.—No. 12.] *DECEMBER 1, 1910.* [TWO SHILLINGS.

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ORIGINAL COMMUNICATIONS.

PROGRESSIVE, PRIMARY (?) ATROPHY, AND ALMOST COMPLETE DISAPPEARANCE OF THE RIGHT IRIS.*

BY

CASEY A. WOOD, M.D.,

CHICAGO, ILL., U.S.A.

THE case I am about to report has its chief interest in its extreme rarity, and the fact that there seems to be no adequate cause for the peculiar conditions about to be described.

Case.

W.R.T——, aged 44, in apparently robust health, consulted me September 25th, 1907, for a progressive disease of the right eye, which he had first noticed, quite accidentally, about three and a half years before.

On inquiring into the patient's history, I found that none of his ancestors had any serious disease of the visual apparatus, and that he himself had not had any difficulty attendant on the use of his eyes, except the usual presbyopia, for which glasses had recently been ordered. Moreover, his general health, so far as he knew, had been perfect. In the fall of 1891, that is, some sixteen years ago, during a football game, he had a collision with a fellow-player's head and sustained a fracture of the right superior maxilla, the break extending through the lower orbital margin. The patient says that there was overlapping (?) of the bones, but that no operation was done for the relief of this condition. Tingling and numbness of the right cheek continued for some weeks after the injury, and finally disappeared.

More recently (in the autumn of 1907 and January, 1908), the patient, however, had two attacks of swelling in the right side of his face, with pain and some discharge from the nose. These attacks lasted for several weeks and were accompanied by painful mastication and soreness at the infraorbital region. The swelling affected the lower lid and extended to the inner canthus.

For the relief of this condition my *confrère*, Dr. Frank Brawley, did an antral puncture on the right side, and irrigated the cavity of Highmore. About an ounce of yellow-green pus was discharged, with relief to the pain and all the other symptoms. A drainage tube was then inserted in the antral cavity, and the sinus was shortly normal again. In Dr. Brawley's opinion, the disease of the antrum was the result of an attack of influenza and not of the original injury.

With this exception, the patient, who has been principal of a private school and has been engaged in teaching for many years, shows, on careful and repeated examinations of his internal organs, no organic lesion, nor is there a history of any dyscrasia whatever.

The important factor in the case, however, lies in the appearance of the right pupil. It so happens that the patient is a fair artist, and, partly from memory and partly from sketches made at the time, has drawn for me the appearance of the right eye (iris and pupil especially) at intervals since the disease was first noticed (Fig. 1). He reports that with the exception of some photophobia (for which he wore smoked glasses on occasions), he has never had any pain or

* Read at the September, 1910, Meeting of the American Academy of Ophthalmology and Oto-Laryngology.

any particular discomfort in the affected eye, although the pupil has been slowly getting larger, and the iris gradually disappearing ever since the lesion was first noticed.

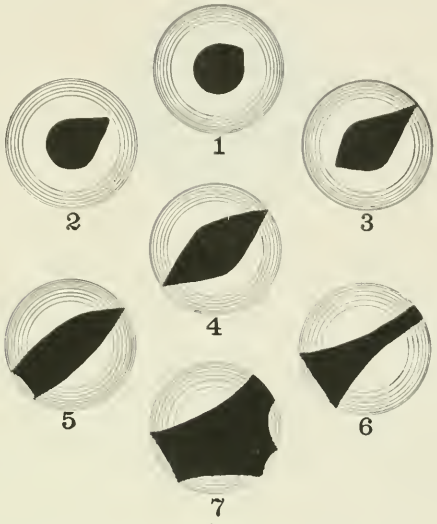

Fig. 1.

Illustrating Casey Wood's case of primary atrophy of iris: the drawings and the dates according to the memory of the patient. 1.—March, 1904: 2. October, 1904; 3.—February, 1905; 4.—November, 1905; 5.—May, 1906; 6.—December, 1906; 7.—June, 1907.

Together with my assistant, Dr. A. N. Murray, I have watched the patient at fairly regular intervals for more than a year since September, 1907, and have witnessed a steady, progressive, and rather irregular disappearance of the iris tissues, unaccompanied by any symptom. Apart from the abnormal condition itself, the only sign that has been noticeable is the *increased tension* in the right eye. Vision during that time continued to be 20/50 *minus*, and the patient readily read Jaeger 1 with his glasses, and he had a normal range of accommodation. The ophthalmoscope showed absolutely no variations from normal. The defective distance vision was due to a compound hyperopic astigmatism, which, when corrected, gives the patient almost as good central sight as he obtained in the left eye, which is emmetropic and is in all other respects normal. Under ordinary circumstances he had usually read three hours at a time without any asthenopic difficulties.

For the purpose of deciding the effects of mydriatics and myotics on the right eye, homatropin and cocain were carefully instilled on three occasions, without increasing the size of the pupil and without raising the tension of the eye, although it had the usual effect on the accommodation. On the other hand, the continued use of eserin and massage did not materially lower the tension and had little or no effect in reducing the size of the pupil.

In the beginning of 1909, fully five-sixths of the iris tissue had disappeared,

and the pupil had assumed the shape of an irregular triangle, whose angles reached almost to the root of the iris, in which situation all the iris layers have become absorbed (Fig. 2).

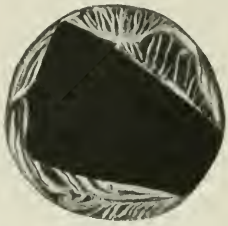

Fig. 2.
Shows (January, 1909) additional atrophy of the Iris Stroma.
Pigment layer still intact. Remainder of iris unchanged.

On examining the anterior layers of the iris with the corneal microscope, it is seen that the depth of the iris tissue varies considerably. It seems to be abnormally pitted here and there, while, except at its margins, the posterior uveal layer is apparently undisturbed. With the Würdemann transilluminator, no part of the iris remnant is translucent, as might have been expected from the enormous amount of irregular atrophy. In other words, absorption of the iris tissue seems to have begun on the anterior surface and to have proceeded irregularly there, while the pigment layer has undergone absorption chiefly, or only, at the pupillary edge. This supposition is the more probable since the patient has light-blue eyes, and consequently a smaller amount of pigment is scattered throughout the anterior layers. At the end of January, 1908, it was found that the nasal segment of the iris responded slightly to bright light, but this reaction did not long persist.

The increased tension in the affected eye has not at any time been marked, and it has not greatly varied in degree until recently.

Let me add that the fields of vision, frequently measured during a period of nearly two years, remained uncontracted for both white and colours.

I now saw the patient less frequently, but witnessed, still, the slow progress of the atrophy and the increase in the glaucoma. The tension rose, the usual glaucomatous contraction of the periphery of the field set in, the ophthalmoscope showed occasional pulsation of the retinal arteries—always when pressure was made on the eyeball—and the patient had attacks of ciliary congestion, with asthenopia, pain, and blurred vision.

In spite of a cyclodialysis, massage with eserine ointment, pilocarpine sweats, etc., all of which gave temporary relief to the glaucomatous attacks, the central vision continued to fall, and, finally, there remained in the right eye only perception of light.

The patient, at the end of 1909, removed to Florida, and there consulted my friend, Dr. Louis A. Bize, of Tampa, to whom I am indebted for further notes of the case. On November 12th, 1909, he reported to me, that "the eye has been painful, congested, and inflamed for two or three weeks; worse the last week; no perception of light; tension not less than +2; only a small ring of the right iris remaining; lens opaque, cornea anæsthetic. Impossible to see the fundus on account of the lenticular condition. Vision in other eye, with correction, 20/15, Jaeger 1. Patient stated that he had noted vision in the better eye was not as good for close work as it had been. Advised

enucleation of the right eye. He had to return home for a few days, during which time I had him try to relieve the inflammatory condition. This he did with eserine, hot applications, salines, daily sweats, and aspirin. He returned on the third day considerably improved. I removed the eye, preserved it in formalin and gave it to the patient to send to you to complete your examination of it. I might add that he now finds his vision clearer for close work."

Pathological Examination of Affected Eye.

The eyeball so kindly sent me by Dr. Bize was given to Dr. Francis Lane, pathologist to the Illinois Eye and Ear Infirmary, for inspection, and I here append his complete report of the gross and microscopical findings:

Specimen P. 335, furnished by Dr. Casey A. Wood, was fixed in formalin .4 per cent.

Gross findings.—Right eye, 22 by 23 by 21 mm., scleral curvature flattened above. Corneal surface very irregular, made especially so by a slightly depressed 1 mm. wide groove, oval horizontally 3-4 mm. from centre. With exception of area 2.3 mm. wide, bordering limbus, the cornea is densely opaque. Root of iris indistinctly visible.

Coronal Section.—Vitreous filled with semi-fluid, gray-coloured exudate which hides all details. By transmitted light pupil slightly irregular, but in general oval-shaped, with long axis 9 mm. in horizontal and 7 mm. in vertical meridian. Optic nerve 4 mm. long. Anterior half sectioned vertically, outer segment blocked. Posterior half sectioned horizontally. Upper segment blocked. Fifty (50) serial sections, 25 *microns* thick, made of both anterior and posterior segments, every tenth specimen being stained with Delafield's hæmatoxylin and eosin.

Anterior 23 and posterior 22 and 23 are van Gieson stained specimens.

Eighty-five (85) serial sections made from optic nerve, every tenth stained with Delafield's hæmatoxylin and eosin, while numbers 22, 32, 43, 52, 62, 72, and 82 were stained with van Gieson.

Anatomical description.—Marked wrinkling of all corneal layers. Epithelial surface extremely wavy. Scattered vacuolated epithelial cells in superior layers. *Ingrowth of vascular granulation tissue from the limbus.* Beneath thickened and somewhat keratosed epithelium, Bowman's membrane and anterior lamellæ destroyed in the area of infiltration. Surrounding the plexus of dilated fine vessels, many round and spindle cells. Few deep-lying vessels near limbus. (Anterior chamber shallow and almost completely filled with albuminous and fibrinous transudate.) *On posterior corneal surface are several areas of fine network of fibrin, in the meshes of which are pigment-bearing wandering cells*, surrounded with fine free pigment granules. Under the precipitates areas are found where endothelial cells have disappeared.

The angle of the anterior chamber completely obliterated by broad fusion of the peripheral part of the iris to the posterior surface of cornea. The corresponding deep layers of the cornea infiltrated, most marked round Schlemm's canal. *Canal patent in every specimen, except in* +14, where complete obliteration has taken place on one side only.

Apposed to the corneo-sclera the iris root is atrophic. In +14 the root reduced to thin film, behind which the retinal pigment has disappeared. *Pigment has migrated into corneal and fibrous tissue in neighbourhood of false angle.* Pupil 6½ mm. wide. The pupillary border of iris pulled forward and outward. On one side anterior surface completely bent upon itself, to such an extent that in +14 the retinal pigment is dragged outward to the false angle of the anterior chamber, and actually bounds the posterior and

outer wall of the latter, so that only back surface of iris faces cornea. On opposite side same distortion, but much less so, showing, however, that sphincter takes part in the ectropion and appears hook-shaped. Iris uniformly degenerated, and thinned, particularly on side of extensive ectropion, where its spongy nature has completely disappeared and been replaced by more dense connective tissue (shown by van Gieson) and clumps of pigment. Iris vessels have thick walls encroaching upon their lumens, several warty excrescences of pigment bearing cells on anterior surface of iris. Specimen +34 shows detachment of broad strip of retinal pigment from posterior iris which corresponds to similar strip attached to anterior lens capsule (old posterior synechia). Specimen +24 shows clumps of deep pigment adherent to posterior corneal surface anterior to ectropic pupillary hook, as if iris had been opposed to corneal endothelium.

Posterior chamber partially filled with albuminous transudate free from cells. Muscle bundles thinner than normal, the processes are shrunken and flattened. In the apices of processes are found subepithelial vesicles of albuminous transudate (recently described by Schirmer as indicative of chronic irido-cyclitis).

Large wide fissures separate peripheral lens fibres. Many eosin stained Morgagnian globules found in the midst of broken-down cortical fibres. Near anterior pole, clump of cells deposited on thinned anterior capsule, behind which cubical cells proliferated to four layers and neighbouring fibres are broken up. Lens nucleus for most part stains with hæmatoxylin.

For short distance on both sides of disc, Haller's vessels over-distended. For most part choroid markedly compressed. Many spaces in ganglionic cell layer corresponding to size and shape of multi-polar cells. Scattered areas of cystic degeneration.

Bowl-shaped regression of lamina cribosa. Sclera bounds lateral walls of excavated cupping. Marked interstitial optic neuritis, evidenced by extensive proliferation of glia and pia throughout nerve trunk and on surface of cupped disc. Anterior to lamina, many minute holes (Schnabel's cavernous atrophy).

Serial sections of optic nerve show extensive vascular degeneration of the central artery. +51 shows complete obliteration of vessel-lumen.

Anatomical diagnosis:—

I. Subacute and chronic fibrino-plastic irido-cyclitis.
II. Chronic secondary glaucoma.
III. Extensive secondary atrophy of entire iris (inflammatory and glaucomatous.)
IV. Vascular degeneration *arteria centralis nervi optici.*

Comments.

Although there can be no doubt about the extreme rarity of these cases of progressive atrophy of *all* the layers of the iris, the few instances that are recorded in medical literature form a fairly well-defined group—so far as the symptomatology is concerned. The patient finds by accident that his iris is disappearing. The surgeon whom he consults, sooner or later, discovers signs of glaucoma, the patient eventually complains of some of the symptoms of that affection, and between the two observers a fine-spun theory regarding the cause of the mysterious disease is evolved.

Disregarding examples of atrophy of the anterior layers, or simple shrinking of the whole organ without entire disappearance of any considerable portion, I wish to refer to three cases that closely resemble my own, Of course, I have neglected cases of atrophy plainly due to traumatism or infectious cyclitis, as well as those conditions following a long-standing or absolute glaucoma.

G. Lindsay Johnson* reports a case of progressive atrophy of the left iris. The right eye had been excised many years previously for a serious injury to the globe. Otherwise the patient has always been healthy. Two years before he was seen by Johnson, the sight of the remaining eye began to fail, and his friends noticed that the pupil grew larger. For seven months Johnson watched the progress of the atrophy, and at the time of writing only a small band of iris, above and below, remained. Vision was very imperfect, and could not be improved by lenses beyond J. 5 and 20/50. The optic disc and macula were unaffected, and the fundus immediately around was healthy; elsewhere there was general atrophy of the choroid. The author offers no explanation of the phenomena, and says nothing about the tension of the globe or the extent of the visual fields.

Harms† gives a most interesting account of a spontaneous, unilateral atrophy of the iris, which closely resembles my own case. I have had reproduced a picture of the atrophied iris in this instance (Fig. 3).

Fig. 3.

Unilateral Spontaneous atrophy of the Iris, as described by Harms.

The patient was a strong, healthy man, whose general condition was practically normal and threw no light on the cause of the atrophy. His refractive error was insignificant, and when seen by Harms, he had a well-marked simple chronic glaucoma.

In justification of the words "primary" and "spontaneous" employed in the titles of our papers, I agree with Harms in thinking that it is quite possible, if our patients had been seen early enough, before the iridic atrophy had much advanced, the eye *might* have been found without glaucomatous signs. In other words, I have an idea that the canal of Schlemm had very gradually closed before or after adhesion of the periphery of the iris to the posterior aspect of the cornea, and that the end-process is a quiet, secondary glaucoma. This theory is all the more probable since the history of both cases shows that for years the gradual disappearance of the iris was noticed without any other symptoms. Finally, if a simple, chronic glaucoma can alone bring about a result of this sort, why do we see so few of them?

*Johnson.—"Atrophy of the Iris," *Ophthalmic Review*, Vol. V, 1886, p. 57.

† Harms.—Atrophy of the iris without mechanical injury. (Einseitige spontane Lückenbildung der Iris durch Atrophie ohne Mechanische Zerung). *Klin. Monatsbl. f. Augenheilk.*, Nov.-Dez., 1903, S. 522.

Dupuy-Dutemps* believes that the peculiar, regular, marginal atrophy of the iris found in a case described by him as associated with tabes, is the result of some interference with the nutrition of the tissues, resulting from disordered innervation of the iris. Furthermore, the writer gives this explanation to account for iris alterations in other patients similar to complete atrophic degeneration of that organ. There was no increase in the tension at the time of writing.

In the cases I have referred to, and in the history of my own patient, there is not the slightest evidence of the central nervous lesion. Consequently, I am forced to conclude (so far as one may, from the meagre evidence, come to any conclusion) that the so-called "idiopathic" or "spontaneous" atrophy of the iris has a varied pathogenesis. It is likely that every example of the disease will be found to exhibit towards the end of the process a more or less marked glaucoma, but this condition probably is, as I have said, only an incident in the progress of the disease. It arises during the efforts of the ocular drainage system to get rid of the irritating products of the primary disease, and is not an essential part of the atrophic degeneration. As shown in my own case, there was a definite migration of uveal pigment from the iris towards the sclero-iridian angle, the escape of the granules being prevented by the complete obliteration of the filtration area, due, doubtless, to a low-grade, exudative, plastic iritis.

A CASE OF TERATOMA OF THE ORBIT.

BY

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AND

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Case.

Name.—R. N. Namagiri, *æt.* 6 months. Hindu female child. Admitted July 21st, 1910. Operated upon July 23rd, 1910. Discharged August 3rd, 1910. *Disease.*—Teratoma of left orbit.

The mother says that the child was born with a tumour about the size of a small lime in the place of the left eye. The left eye was not to be seen. The tumour has grown steadily, and is now about the size of an orange. Relatively to the child's head, the growth is enormous. It measures 75 mm. from above downwards, 62 mm. from its front surface to the face, and 65 mm. from side to side. The mouth, nose, and cheek are pushed to the right side. The skin covering the tumour is stretched, but not involved. A net-work of blood vessels can be seen in the skin. These vessels are not, however, markedly dilated. The mother says that there has all along been an ulcer over the anterior aspect of the growth, with discharge of blood and purulent matter. This ulcer has been growing with the growth of the tumour.

The general health of the child is good, and she is remarkably well nourished. The photograph (Fig. 1) shows the general appearance. The fornices have been obliterated, and the conjunctiva is spread out as an even oval pink sheet over the front of the tumour. There is a large superficial ulcer over the middle of

*DUPUY-DUTEMPS. "Sur une forme spéciale d'atrophie de l'iris au cours du tabes et de la paralysie générale. Ses rapports avec l'irrégularité et les troubles réflexes de la pupille." *Ann. d'Oculist.*, septembre, 1905, p. 190.

this surface, which is pigmented, as if the remains of an eye were present there. Examined by Sachs' transilluminator, the tumour is translucent in every direction except on the presumed site of the eyeball, where there is a small opaque area. The tumour fluctuates readily throughout.

FIG. 1.
Front view.
Before Operation.

FIG. 2.
Front view.
After Operation.

Operation.

July 23rd, 1910.—A circular incision through the skin was made concentric with the conjunctival margin. The skin was dissected back and the fluid contents of the cyst (15 cc. in all) withdrawn in three large syringefuls and handed over to Captain A. C. Ingram for examination. It was then felt that there were a quantity of solid contents. The cyst shelled out easily, leaving what seemed like a pedicle behind at the apex of the orbit. This was apparently due to the fact that the growth had taken place in the intra-muscular cone, and the cyst had practically come to fill the whole orbit. There was a little arterial bleeding, but not much. The cavity was plugged, and the skin flaps were drawn over the plug and sutured together, leaving an aperture for the removal of the dressing. Whilst working on the inner side a small cavity was opened, and some dirty, mucilaginous fluid escaped. This was quite different in consistency and appearance from the clear fluid drawn off with the syringe. The bones of the orbit were enormously opened out by the growth.

After-Course.

August 1st, 1910.—The cavity is rapidly diminishing and the skin wound has healed by first intention, closing in the orbit. The facial deformity is already decidedly diminished.

August 8th, 1910.—The orbital opening measures 35 mm. vertically and 45 mm. horizontally as against 23 mm. vertically and 28 mm. horizontally on the opposite side (Fig. 2).

The after-course of the case was uneventful. R. H. ELLIOT.

Pathological Report.

On receipt in formalin, the tumour appeared as a large, rounded, solid mass, white in colour and of the consistency of unusually firm fat, with some large, collapsed, thin-walled cysts on its surface.

The tumour was cut in half, and portions of tissue from one-half were removed, prepared in several different ways, and sectioned.

The mass of the tumour was composed of fat cells of unusually large size, in which were embedded a number of small dermoid cysts, containing sebaceous material and short, black hairs. An irregular, small, knobby but rounded piece of bone was found embedded in the fat in one place. In the lower part of the tumour, an irregular cystic piece of cartilage was found, through which ran a rounded cord (optic nerve) to reach a flattened pigmented mass in front (the eye).

The large cysts were distended during life by a quantity of clear straw-coloured fluid, which contained a quantity of albumin and globulin, together with a trace of mucin.

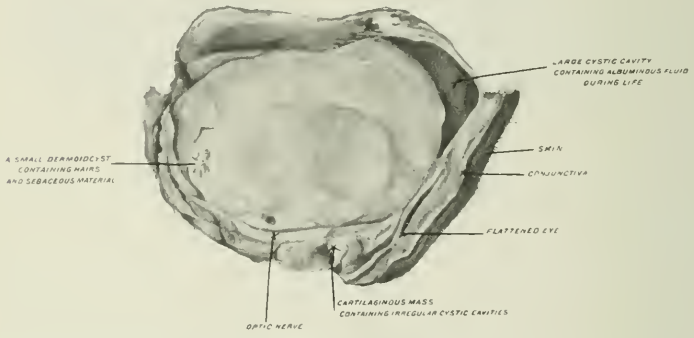
LARGE CYSTIC CAVITY CONTAINING ALBUMINOUS FLUID DURING LIFE
A SMALL DERMOID CYST CONTAINING HAIRS AND SEBACEOUS MATERIAL
SKIN
CONJUNCTIVA
FLATTENED EYE
CARTILAGINOUS MASS CONTAINING IRREGULAR CYSTIC CAVITIES
OPTIC NERVE

FIG. 3.

The mass of the tumour consisted of fat in which were found some small irregular pieces of bone, numerous small dermoid cysts, containing hairs and sebaceous material; pieces of cartilage associated with cysts lined by columnar epithelium, and mucous glandular acini. In one place nervous tissue, closely resembling grey matter of cerebral convolutions, was found.

Sections of the dermoid cysts showed them to be lined with a layer of stratified epithelium, bearing hairs and sebaceous glands, resting on a thin layer of fibrous connective tissue. The large cysts were also lined by a delicate layer of stratified epithelium, bearing very fine hairs and sebaceous glands. No sweat glands were found in any of the cysts examined; there was some imperfect keratinization of the superficial layers of the epithelial cells. The fatty tissue contained here and there a little connective tissue, carrying small blood vessels and in one place a small mass of plain muscle fibres was found. Sections of the bony mass showed it to be composed of true cancellous bone, with laminæ mostly parallel with the surface; there was no periosteum and no cartilage upon it.

The cartilaginous mass was found to consist of well-formed hyaline cartilage, containing cystic cavities lined by tall columnar ciliated epithelium, resting on a thin delicate layer of loose connective tissue. Between and around the pieces of cartilage were several well-formed glandular alveoli, closely resembling in structure serous salivary alveoli.

In one section, in close connection with a layer of stratified epithelium bearing sebaceous glands and hairs, I found a tissue closely resembling immature grey matter of a cerebral convolution. This tissue contained small irregular pyramidal cells with ill-formed processes embedded in delicate reticular tissue. Nissl bodies could not be demonstrated in these cells.

A portion of the tumour, prepared and stained by Beckton's method, showed no Altman's granules.

Sections of the flattened pigmented mass, which apparently represented the eye, showed it to be composed essentially of three layers. The posterior layer consisted of dense, flattened, laminated fibrous tissue representing the sclerotic. The anterior layer consisted of swollen fibroid tissue arranged with more or less parallel layers of cells, covered by a thin layer of stratified epithelium in front. There was much round-celled infiltration of the epithelium and anterior layers of the fibroid tissue. This layer apparently represented the cornea, since the epithelium was continuous with the thicker conjunctival epithelium covering the anterior surface of the tumour. The middle layer contained a large amount of dense, black, granular pigment, arranged in irregular masses in fibro-cellular connective tissue. At the angles and over the posterior layer there were very numerous blood vessels and irregular vascular spaces; there were also some plain muscle fibres apparently unconnected with blood vessels and a few spaces lined by a single layer of irregular cubical epithelium. This middle layer apparently represented the choroid, ciliary body, and iris. No trace of retinal structures could be discerned.

I am of opinion that, according to Adami's classification, the tumour is a true filial teratoma. The tumour has in its growth gradually compressed the eye, or prevented its proper development. The presence of immature grey matter is most unusual. A. C. INGRAM.

ON TUBERCULO-TOXÆMIA OF THE EYE, AND ON THE THERAPEUTIC AND DIAGNOSTIC VALUE OF INJECTIONS OF TUBERCULINE IN ITS TREATMENT AND DIAGNOSIS. A CLINICAL CONTRIBUTION.

BY

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TUBERCULOSIS of the conjunctiva, of the iris, and of the choroid has long been recognised as a serious disease, often ending in total destruction of the globe. If the eye be enucleated, sections of the diseased tissues may show typical tubercles containing giant cells and often tubercle bacilli. This malignant form of tuberculosis may be a primary manifestation when situated in the conjunctiva, or it may be secondary to tuberculous foci elsewhere in the body; this being usual when the uveal tissues are attacked.

It is only comparatively recently, however, that it has been recognised that many diseases are incited, not by the presence of tubercle bacilli in the tissues of the eye, but by tuberculo-toxines circulating in the blood, generated in foci elsewhere in the body.

A careful study of these inflammations will show that they have many characteristics which, although rarely sufficiently pathognomonic to warrant a definite diagnosis, yet enable the ætiology to be suspected.

My attention was drawn to the matter by the observation that the condition produced in certain eyes by the use of Calmette's tuberculine, the phlyctenulæ, the interstitial keratitis, the corneal ulcers, was almost identical with that seen in some eyes in the Polyclinic. The phlyctenulæ, the keratitis both deep and superficial, and the irido-cyclitis caused by the toxines of tubercle can often be differentiated from somewhat similar conditions induced by other agencies. Tuberculo-toxic interstitial keratitis is often distinct from that due to congenital syphilis, and still more easily can the typical phlyctenule caused by tuberculo-toxæmia be distinguished from the ordinary phlyctenule, which, as N. Bishop Harman has pointed out, may depend upon a certain nerve distribution, and is generally found in one situation.

The final diagnosis can be made only by the help of tuberculine and with certainty only when a local reaction in the eye follows the injection of tuberculine subcutaneously.

Three chief methods have been adopted, *viz.*, Calmette's ophthalmo-reaction, von Pirquet's cuti-reaction, and subcutaneous injection.

A prolonged trial of Calmette's method led me to abandon it as utterly unreliable and very dangerous.

Of von Pirquet's reaction I have little experience, but the best authorities state that it gives a positive reaction in 90 per cent. of all adults, and is in consequence only of value in children.

The third method, in my hands, has proved of immense service, and is apparently quite innocuous.

My observations are unfortunately deficient in two directions. First, in many cases the notes are not nearly as full as they should be, and in some can only be described as "scrappy"; and, secondly, bacteriological investigations should have been made of all cases of superficial keratitis and corneal ulcer. Unfortunately, in a small general hospital little skilled assistance can be obtained in the eye department, and, in consequence, the amount of time which can be spared for special note-taking and bacteriology is strictly limited.

During the past two years I have used tuberculine in some thirty cases, both as a diagnostic and as a therapeutic agent. For diagnosis, Koch's old tuberculine was exclusively employed. It was obtained from Messrs. Allen and Hanbury, in flasks which they call "*Azoules*," and this product has invariably proved trustworthy. Some 100 injections have been made with it, generally by the Sisters of the Coventry Hospital, and in no single instance has any inflammatory trouble occurred. The same remarks apply to the new tuberculine T.R. furnished by the same firm.

Every case to be tested was admitted to the Hospital, and a four-hourly chart kept for a few days. Then, if the temperature was normal, the first injection was given. This was generally ·001 c.cm. of old tuberculine, and was made into the arm. In small children half this amount was occasionally used, but I have, even with babies, never seen any ill-effect from a full dose. The condition of the eyes was carefully noted by the Sister who gave the injection. In a few cases, the opsonic index was determined before the first injection was made. I must express my thanks to Dr. M. Acheson, the senior house surgeon to the Hospital at the time, for the trouble he took in collecting the blood and sending it to London for determination. Mr. Acheson has had special experience in this work, and his assistance was most valuable.

We, however, both concluded that determinations of the opsonic index, unless made by a known expert, and upon the spot were of little value. The figure was almost always within two-tenths of unity, 0·9 to 1·2, and we felt that we could assume this index and thereby save the great expense involved.

The second injection of ·002 c.cm. was given after 5-7 days if there was no reaction. Then about one week later ·004 c.cm. was injected. The reaction, both general and local, was almost always a mild one. Generally, the temperature rose after twelve hours to 100·2 F., and the patient had a headache and felt unwell. Next day he was feeling quite well. The local reactions observed were, aching in the eyes, ciliary blush, and an increase of retinal pigment. In one case there was a marked increase of pigmentation round the disc, and in others there was an increase in the pigmentation round choroidal *plaques*.

Several cases failed to react, even to the third injection, thus disposing of the suggestion that the final reaction depended upon changes induced by the earlier injections. It is true that if we drop tuberculine into an eye, and then inject it *sub cute* a violent reaction ensues locally, but this is an entirely different question. I have been able to find no evidence that the subcutaneous injection of a dose of tuberculine induces changes in the body which enable it to react to a subsequent dose.

Old tuberculine proved valuable, not only as a diagnostic, but as a curative agent. In a large number of my cases the effect of the reaction upon the eye can only be described as marvellous. I have satisfied myself absolutely that in old tuberculine we possess a valuable therapeutic agent, which is far more useful than new tuberculine.

Case III illustrates the curative action better than any other. Here we have a woman led to the hospital almost blind from vitreous opacity, walking home alone three weeks later with V. = 6/24. This change rapidly followed the reaction to old tuberculine, when the orthodox methods had failed.

New tuberculine was used as a therapeutic agent in the out-patient room. Generally, 1/2,000 mgm. (old style) was injected. The patient attended twice on the next day to have his temperature taken. One or two injections were given every week. After about a month 1/1,000 was used, and, finally, 1/500 mgm.

It has been very difficult for me to decide upon the exact value of these injections. Some cases certainly did marvellously well, for example, Case II. Others appeared to be harmed at times and to be benefited at others. Once or twice 1/500 mgm. caused a slight reaction. In each case the eye was worse after this reaction. In one instance fresh phlyctenulæ developed.

No patient who failed to react to the test injection of old tuberculin was in any way improved by the injections used.

The cases treated fall under four heads.—Choroiditis at the posterior pole; cyclo-iritis, sclero-iritis, and interstitial keratitis; and, finally, phlyctenular conjunctivitis and keratitis.

I have purposely excluded the first group from this paper, as I have treated it separately in an article on "*Obsolescent Tubercle of the Posterior Pole in Children*," which appeared in this Journal (June, 1910). The characteristics of this disease are well marked, and in an early stage may be very favourably influenced by treatment with tuberculine. The ophthalmoscopic appearances are very typical, and the use of tuberculine enables a correct diagnosis to be made with certainty.

It is in some types of cyclitis and irido-cyclitis that tuberculine has been of

the greatest practical value, both as regards diagnosis and treatment. The usual condition found in an example due to tuberculous toxæmia is a very chronic insidious cyclitis which is liable to periodical exacerbations during which there is a copious deposit of "mutton fat" keratitis punctata and great opacity of the vitreous. This takes the form of a general haze more dense in the central portion.

I have so far not seen the sand-like vitreous opacities which characterise the syphilitic type, nor the large floating masses which follow hæmorrhage and are found in myopic choroiditis. A massive pigmented anterior choroiditis has never been seen, nor have I detected the fine pigmented keratitis punctata, which is often present in cyclitis dependent upon oral or intestinal sepsis. As the disease progresses the tendency is for synechiæ to form, and these may end in a seclusio pupillæ with permanent low tension and amaurosis. I believe the patients first suffer from a cyclitis, and later from an iritis. Up to the present I have seen no case of simple iritis which I could trace to a tuberculo-toxæmia. The effect of tuberculine has in my cases been little short of marvellous.

The second group includes examples of scleritis and of interstitial keratitis. Generally, the interstitial keratitis is peripheral and confined to a sector in the neighbourhood of a patch of scleritis. The corneal inflammation, in fact, appears to be an extension of the scleral inflammation into the corneal tissue. This may clear up rapidly as the scleral disease improves, and may reappear with a recurrence of the scleritis. It is quite distinct from sclerotising keratitis following chronic recurrent scleritis. The scleritis is often associated with a nodular condition of the conjunctiva, which may rapidly disappear as the scleritis abates. Although this is typical of the keratitis due to tuberculo-toxæmia, I record a case in which the whole clinical picture was one of congenital syphilitic interstitial keratitis, accompanied by choroiditis disseminata and vitreous opacity. This case got worse under mercurial treatment, but made an excellent recovery under tuberculine injection. It is apparently a fact that these tuberculo-toxic cases are harmed by a mercurial course, and, as they can easily be confused with examples of keratitis following syphilis, the routine use of the tuberculine test is essential in all doubtful examples.

The last group contains the largest number of cases, and they are mostly in children. The tuberculo-toxic phlyctenule is generally a large florid growth often surrounded by a thickened nodular conjunctiva. It is very prone to relapse and is associated with much photophobia and blepharospasm. Corneal ulcers which may spread in an annular manner round one side of the cornea frequently complicate the conjunctival inflammation. One type is very chronic, and begins to mend only when tuberculine is used; a second type rapidly disappears when yellow oxide of mercury ointment is employed. These children were called "strumous" by the older surgeons, and the results of tuberculine test injections only shows how correctly they gauged the true nature of the complaint.

The cases of phlyctenular keratitis recorded would have had far more value had a routine examination been made of the parasitic flora. Unfortunately, lack of time and the necessary apparatus made this impossible.

I publish these notes, not as showing anything new or original, but simply as a clinical contribution to the literature of the subject, which is already very extensive on the Continent of Europe.

My conclusions may require considerable modification; in fact, they do but constitute a working hypothesis round which new facts may accumulate.

GROUP II. CASE I.

Interstitial Keratitis and Phlyctenulæ.

E.C., age 15 (201, 753, 3,302).

Feb. 27th, 1907. First seen. Gave a history that her eyes had been bad for years. Is daughter of P. C., Case IXA. Said to have had corneal ulcers after measles. Has no sign of syphilis, teeth normal.

Present Condition.—There is an interstitial keratitis of both eyes, the left being the worst. There is no pericorneal injection, or injection of the conjunctiva, but much photophobia. V.R. and L less than 5/50

March 7th. Has greatly improved under ordinary treatment.

July 10th, 1908. The corneal opacity has cleared up very considerably ; is much better.

July 28th, 1909. There is, on the outer aspect of the left eye, a large phlyctenuloid mass 5 mm. in vertical, and 3·5 m m in horizontal diameter, extending from the limbus outwards. There is a diffuse keratitis in the immediate neighbourhood of this mass of tissue, V R = 5/20, V L 5/20. There is a chronic rhinitis and eczema of upper lip. This phlyctenuloid mass rapidly disappeared when treated with Ung. flav. c atropina.

Aug. 18th, 1909. Admitted. The phlyctenule has almost gone, and the left cornea is free from inflammation, but the original interstitial keratitis has left a slight stippled nebula. There is still much rhinitis for which no intra-nasal cause can be detected. Patient reacted to the second injection, ·002 c.cm. of old tuberculine, she complained of nausea and of urticaria, and the temperature rose to 99·4.

Sept. 2nd. Discharged. The eye now shews no injection whatever, and except for the nebulæ is normal in appearance. There is still some eczema of the upper lip caused by the watery discharge from the nose.

Sept. 6th. 1/2000 mgm. of T.R. injected.

Sept. 13th. ,, ,, ,, ,,

Sept. 15th. The left eye has relapsed, there is a recurrence of the old keratitis, the cornea at the outer aspect is stippled and vascularised. The rhinitis is worse

Sept. 25th. Has had no further injection. The nose is better, but the right eye is injected and there is considerable photophobia.

Oct. 4th. Has had no injection for 14 days. The condition of the right eye is much worse.

Oct. 11th. The right eye is much better, but the left is now much inflammed. Both pupils well dilated with atropine.

Oct. 11th. 1/2000 mgm. of T.R injected.

Oct 18th. ,, ,, ,, ,,

Oct. 26th. ,, ,, ,, ,,

Oct. 25th. Severe relapse of left interstitial keratitis. The whole cornea is hazy and there is much ciliary injection and photophobia.

Nov. 2nd. 1/2000 mgm. of T.R. injected.

Nov. 8th. 1 1000 ,, ,, ,,

Nov. 15th. ,, ,, ,, ,,

Nov. 9th. Both eyes much better, although the right eye shows some fresh phlyctenule.

Nov. 22nd. Both eyes almost well. Since this date patient has been seen from time to time, and has remained free from serious relapse, although occasionally there has been a mild recurrence of photophobia and injection.

Remarks. It was difficult in this case to decide whether or no the condition of the eyes, a recurrent interstitial keratitis and recurrent phlyctenule, was benefited by the tuberculine treatment. It was probably a case where a careful study of the opsonic index would have been of great value.

At one time the injections seemed to do harm, and were discontinued, but then the inflammation got worse. They were restarted and the immediate effect was that the eyes became decidedly worse for a time, but they were continued and the eyes rapidly got almost completely well.

The girl's father had a similarly large phlyctenuloid mass which, however, did not disappear and was excised, as stated under Case IXA.

I believed that syphilis had no share in the etiology, but that the keratitis was essentially tubercular in origin, the result of a tubercular toxæmia.

CASE II.

Interstitial Keratitis, Vitreous Opacities, Optic Atrophy and Choroiditis.

G. W., age 20 (1548-3828).

April 2nd, 1908. First seen.

History. Sight lost in the left for "several years," right now failing rapidly.

Family History. Mother died insane, her condition being due to ill-treatment she received in Canada from her husband, who was an old soldier and a rogue.

Present Condition. A frail delicate-looking girl, whose appearance suggests tubercle rather than syphilis. She has recently had a chronic cough, but examination has revealed no signs of phthisis. Has lost flesh of late. No night sweats or hæmoptysis. Earns her living by grinding the jewels for watches. The corneæ are both covered with faint remains of an old vascularisation, the appearance is typical of that left by interstitial keratitis. Cornea otherwise clear. The left eye is completely blind. There is no P.L., the left fundus is spread with small foci of pigmented disseminated choroiditis.

The disc is completely atrophic. Media clear. The right vitreous is very hazy, but there are no definite opacities. The fundus is apparently normal but no fine details can be seen. V.R. = 5/20 not improved. The obvious diagnosis was congenital syphilis, interstitial keratitis, and choroiditis. Patient was at once put upon a mercurial course, which was rapidly pushed until the gums were touched.

May 4th. During the past month there has been no improvement whatever from the anti-syphilitic treatment; on the contrary, the vision of the only seeing eye has sunk to 5/50. The vitreous has become much more opaque, and slight pallor of the right disc is noted, with contraction of the retinal arteries.

May 12th. Patient admitted and treated by inunction of oleate of mercury, combined with pilocarpine and hot packs. There is now slight concentric contraction of the field, the temporal field only reaching 60°, VR = 5/50 not improved. The vitreous is muddy, but no opacity can be detected. The central part of the vitreous is more opaque than the peripheral portion.

May 20th There is no improvement whatever from the mercurial course, rather the reverse; .001 c.cm. of old tuberculine injected. No reaction.

May 23rd. VR = 5/30 partly. For the first time the vision has improved. The left eye is absolutely devoid of injection and for years has neither been red nor painful.

May 24th. ·002 c.cm. of old tuberculine injected. The temperature rose to 101·1°. There was much general malaise, and *slight ciliary congestion of the left eye.* That is to say, that the eye, which for years had been quiescent, showed a local reaction.

May 28th. Has pain in both eyes.

May 29th. VR = 5/30 all. No pain, no injection, tuberculo-opsonic index = 1.

June 4th. Tuberculo-opsonic index = 1·01.

June 26th. V R = 5/20. The patient now commenced a three months' course of T.R. Two injections were given every week commencing at first with 1/2000 m.m.g., rising to 1/1000 and eventually to 1/500. Under this treatment the patient's weight gradually rose, she improved in general health, and her vision was bettered from 5/30 to 5/20, and eventually to 5/15 uncorrected. All signs of atrophy of the right disc had disappeared. After six months' interval a short course of injections was extended over six weeks, and patient left off attending. Her vision was now sufficiently good to enable her to return to her work.

Jan. 24th, 1910. Returned to the Hospital. Has had a cough all the winter

$$\text{VR } c + 0{\cdot}75 = 5/10 \text{ partly.}$$
$$+ \quad 4 \text{ at } 155°$$

An examination by Dr. Webb-Fowler, Physician to the Hospital, revealed no definite evidence of phthisis, but there was some prolonged expiration, and some occasional moist sounds at the left apex. Some enlarged glands above the left clavicle. The condition of the cornea is the same. The right vitreous is still not clear. The disc has lost its pallor, and the arteries are normal in size. Reads Snellen (0·6). Round the macula of the left eye there are some white plaques of choroidal atrophy surrounded by pigment. At the periphery foci of pigmental choroidal atrophy are scattered all over the fundus. The atrophy of the left disc is complete. Sent to a convalescent home.

Remarks.—This patient, more than any other I have investigated demonstrates the absolute necessity of using tuberculine as a diagnostic agent. Clinically, the case was typically of syphilitic ætiology, but an anti-syphilitic course only did harm. Tuberculine at once showed the true *fons et origo mali,* and its use was followed by a rise in visual acuity from 5/50 (not improved) to 5/10 partly (corrected). A young girl who was rapidly going blind was enabled to resume her work and maintain herself.

Case last seen Oct. 24th, 1910. Has been quite well up to now, but to-day there is a slight ciliary blush of the right eye. Put on atropine, to have a fresh course of T.R.

Case III.

Chronic Iritis, Cyclitis and Vitreous Opacities.

M. B., age 42. (2230 3904)

Nov. 9th, 1908. First seen. Gave history of having lost all sight in the right eye 9 years ago. Was treated at "Moorfields." The left has only recently began to fail. On the right side there is complete seclusio pupillæ, T 2, V = P L bare. The eye is painful at times.

Left Eye. "Mutton Fat" K.P., slight ciliary congestion and some vitreous opacities. Sees better when the pupil is dilated. Pupil dilates normally, no synechiæ. V.L = 5/20 ptly.

Jan. 11th. Has been treated with atropine locally, and generally with mercury perchloride and potassium iodide.

Lost sight of till *Feb. 9th,* 1910. Came up with slight injection of left eye and much K.P. V.L. = 5/10 not improved. Put on atropine drops.

March 14th. Appeared again in great distress saying "she was rapidly going blind." This on examination proved to be correct. VL = fingers at 1 foot only; TL – 1.5; eye very painful; much K.P. Fundus not seen on account of dense vitreous haze.

March 16th. Admitted. Had to be led to the Hospital, V.L. = hand reflex only. Fundus not seen, only dim red reflex. Pupil almost fully dilated, a small synechia below. Has had 14 children, 7 have died. Two of these were 7 months' children, others died of various children's diseases. No history or

sign of syphilis. There is a scar of an old glandular abscess in the neck. Put to bed, and on *March 17th* a subconjunctival injection of oxy-cyanide of mercury with acoine was given. This was repeated on the 20th.

March 30th. There has been no improvement noted in the eye as the immediate result of these injections. '001 c.c.m. of old tuberculine injected in the arm No reaction.

April 4th. '002 c.c.m. of old tuberculine injected. There was a brisk reaction, the temperature rose to 100·8, and pain in several joints was experienced. Patient also complains of pain in the left eye, she had had no pain at all since she entered the hospital—a decided *local reaction.*

April 11th. A third subconjunctional injection was given.

April 13th. The condition of the eye has greatly improved since tuberculine was injected. VL = 6/36. Much less K.P. No pain and no ciliary injection. T. now normal.

April 19th. VL = 5/20th. No fundus details yet seen on account of the vitreous opacities.

April 21st. Injection of T.R. 1/2000 mmg. No reaction.

April 25th. VL = 5/20. Discharged.

April 30th. Injection of 1/2,000 T.R. Has had some teeth out. Still much mutton fat K.P.

May 9th. VL 5/15 c +1·25 = 5/10. Injection of 1/2000 V.R. At the present time this patient is having two injections a week of T.R. (1/2000 mmg.). Before the first dose was injected she was for all practical purposes blind, her condition was quite stationary under orthodox treatment, but after she had reacted to her second injection all her symptoms rapidly disappeared, and her acuity rose from hand reflex to 5/10.

Case last seen October 20th, 1910. Remains absolutely well. V.L. = 6/12.

Case IV.

Chronic Irido-cyclitis.

A. M., age 19. (91P)

May 1st, 1909. First seen. Has had inflamed eye for about 3 years. Is now wearing —1·5 in deeply smoked glasses.

RV c—4 = 5/30. T+1/2.

LV c—4 = 5/10. T+1/4.

There is slight circumcorneal injection of each eye, and there is much "mutton fat" K.P. in kidney shaped masses. It accumulates at the lower portion of the anterior chamber, almost forming a hypopyon. There is some loss of gloss of the lower half of each iris, and there are some synechiæ between iris and lens capsule. The pupils react well. Has had no pain. All unsound teeth have been removed. There is no evidence of syphilis. Suffers from indigestion and chronic constipation. The right fundus cannot be clearly seen as there is some exudate in the pupil. Left fundus normal, and media clear. Was first treated with atropine, and with mercury pushed till the gums were touched slightly. The right pupil did not dilate much being considerably bound down by synechiæ.

June 4th. VR c—4 = 5/50 ptly.
VL c —4 = 5/15.

Sept. 9th. In spite of treatment no marked improvement, more K.P.
VR c—4 = 5/20.
VL c—4 = 5/10.

Oct. 22nd. Decidedly more K.P. Calmette's tuberculine 1 per cent. solution instilled. *No reaction.* Admitted to Coventry Hospital and treated with pilocarpine and hot packs and received three sub-conjunctival injections of mercuric oxycyanide, 1-5000, with acoine. In the hospital patient showed a slight hectic temperature. Owing to an error the atropine was neglected, and in consequence a fresh adhesion developed on right side.

VR c—4 = 5/20.
VL c—4 = 5/10.

Mar. 17th. Condition the same, but VR = 5/10.

July 14th. Readmitted to hospital.

Nov. 16th. .001 c.c.m. Old tuberculine injected. No reaction.

Nov. 22nd. .002 c.c.m. Old tuberculine injected. Severe reaction. Temperature rose to 102.8, and felt generally ill. At the same time there was a marked *local reaction* shown by ciliary injection and pain in both eyes.

Aug. 9th. There is much atrophy of the lower part of the iris where there is a broad synechia No vitreous opacities seen. No choroiditis. No signs of stretching in fundus. The left disc is now surrounded by a ring of pigment which was unnoticed before.

Aug. 21st. The pigmentation round the disc is less marked. There is a small grey lenticular mass near the right macula, and at the macula itself there is some disturbance of pigment. This tuberculous deposit was not noticed before this visit, and is almost certainly of recent origin.

Oct. 4th. There is very much less pigmentation round the left disc. This increase in pigmentation would appear to have been part of the *local reaction.* VR and L c—4 = 5/10.

Nov. 11th. The atropine has been gradually given up. VR and L c—4—5 6 ply. The eyes now show no signs of any inflammation except some spots of K.P., which are not recent. At the present time, except for the old spots of K.P., the eyes are free from any sign of inflammation

Remarks. This case of chronic irido-cyclitis was only correctly diagnosed by the use of tuberculine, which gave a decided local reaction evidenced by ciliary blush, by pain, by an increase in retinal pigmentation and perhaps by the appearance of a small tuberculous deposit at the posterior pole of the right eye It is, however, possible that this was overlooked for a time, for the right fundus was at first only seen with difficulty. The result of the reaction was that a gradual and permanent improvement was noticed. Before this injection, years of orthodox careful attention had been fruitless, and the eyes appeared likely to deteriorate rapidly.

Case V.

Acute Iritis, Scleritis.

A J., age 37. (1717, 3167).

June 1st, 1909. First seen. Has a diffuse scleritis of the right eye at X o'clock. There have been several severe attacks of inflammation here, and there is much thinning of the sclerotic outwards and upwards. The pupil only dilates partially and there is some haze of the vitreous. There is much ciliary injection. The patient was admitted.

June 4th. The opsonic index found to be 0·99 to tubercle.

June 7th. ·001 c.cm. of old tuberculine injected. Had a slight headache after this, but no reaction.

June 10th. ·002 c.cm. of old tuberculine injected. Patient after this felt ill and the eye ached severely. Temperature rose to 100·2.

June 13th. There was a slight secondary reaction.

June 14th. The eye has rapidly improved.

June 26th. Tuberculo-opsonic index 1·25.

July 4th. Injection of T.R. 1/2000 m.m.g.

July 9th. The eye has relapsed. There is a fresh onset of iritis. Below the right eye there is a group of nodules in the conjunctiva.

July 11th. Pupil fully dilated with atropine.

July 21st. 1/2000 mgm. T.R. injected. Atropine irritation ; scopolamine substituted.

July 28th. 1/2000 mgm. T.R. injected. The nodules have almost disappeared.

Aug. 4th. 1/200 mgm. T.R. injected. All the nodules have disappeared. Scopolomine well tolerated.

Aug. 11th. 1/2000 mgm. T.R. injected. Eye nearly well. All injection gone, but some thinning of sclera up and out. Injections given on September 8th, 22nd, 29th, October 7th.

Aug. 18th. The eye is now quiet, but there is a small patch of corneal opacity at VIII o clock.

Oct. 13th. There is now a definite patch of episcleritis on outer aspect of right eye. There is no obvious iritis. Pupil mobile.

Fresh injection on November 3rd and 17th. Eye got perfectly well.

Remarks. The test injections of old tuberculine were followed by a rapid improvement, but the treatment with T.R. was of doubtful value, in fact, at times it seemed to do harm. The patient, however, was always anxious to have the injection, as she said she felt so much better.

Case VI

Corneal Ulcer, Iritis, Interstitial Keratitis.

A. B., aged 41. (3295).

Sept 1st, 1909. First seen. Has for some weeks been under treatment with atropine by a medical man with considerable ophthalmic experience. Has acute iritis with intense injection of the left eye. Has had much severe pain. The pupil is not dilated although atropine has been freely used. The anterior chamber is very deep. There is a peripheral corneal ulcer at X o'clock. At each extremity of the ulcer there is a scar of recent ulceration.

Sept. 6th. The general condition of the eye is no better, but the ulcer which has been treated by atropine and bandage has healed. The pupil is still undilated, and the injection is worse than ever.

Sept. 4th. Admitted. Treated with atropine, dionine, hot fomentations, etc. There are no signs of syphilis, no history of tubercle, no signs of tubercular disease elsewhere.

Sept. 16th. The right eye is now affected. There is slight pericorneal haze, and there is a diffuse corneal haze. Two injections of old tuberculine were now given, and patient reacted to the second. After this reaction a rapid improvement set in and the second eye at once got well.

Oct. 4th. Discharged. No injection of right eye, left very much better.

Oct. 11th. V.R. = 5/50. V.L. = fingers at 4 metres. The right eye is very much worse to-day. there is much pericorneal injection, and the cornea is hazy.

Oct. 21st. Injection of 1/2000 mgm. of T.R.

Oct. 27th. Both eyes almost free from injection. 1/2000 mgm. of T.R. injected.

Nov. 17th. Injection of 1/1000 of T.R.

Nov. 21st. Injection of 1/500 mgm. of T.R. Had a reaction after this, felt ill and nauseated ; in fact, was too ill to come up to have her temperature taken.

Nov. 30th. After this injection both eyes got considerably worse again, and *phlyctenulæ appeared at each end of the horizontal diameter of each cornea.* The injections were discontinued, and the eyes gradually got well

Remarks. As is usual in these cases of tubercular toxæmia the inflammation rapidly subsided after the initial reaction to old tuberculine. But the reaction which followed an excessive dose of T.R. had a decidedly prejudicial effect, at any rate for a time.

Case VII.

Chronic Iridocyclitis, Vitreous Opacities.

A. R., age 58.

Aug. 16th, 1908. Admitted to hospital. Patient has been under treatment as an out-patient since March for chronic iridocyclitis with synechiæ, keratitis punctata, recurrent iritis and vitreous opacities. V.R. sank from 5/20 to fingers at 2 metres. V.L. + 1·5 5/10. Right fundus only faintly seen, no details. Left, dimly seen. Large vitreous opacities. Has been treated with perchloride of mercury. Cannot take K.I. as it causes violent urticaria. About once a month the left eye becomes injected and gets painful. T.L. —1·4. There is now no K.P., but it has been present.

Aug. 19th. Injection ·001 c.cm. Old tuberculin. No reaction.
Aug. 23rd. ,, ·002 ,, ,, ,,
Aug. 30th. ,, ·004 ,, ,, ,,

The result of the test is to show that the disease was non-tubercular. She was accordingly treated with injections of pilocarpine and hot packs, and was discharged on September 14th. No improvement resulted from the tuberculine injection. Subsequently iridectomy was done on both sides, and since then the eyes have been quiescent, and there has been no return of the attacks of iritis. The sight of the left, the better eye, is however gradually deteriorating. This case can be contrasted with Case III, M.B. A similar condition proved to be tubercular, and although the sight was much worse, it improved rapidly under treatment with tuberculine.

Case VIII.

Tuberculous Dacryocystitis.

E. B., age 18. (68 W.)

June 14th, 1909. First seen.

History. For some months the right lacrymal sac has given trouble. At times has got red and swollen. Constant epiphora.

P.C. The right sac can be palpated as a small hard body, with thickened walls. No pus can be squeezed out, and fluid syringed into the canaliculi passes freely into nose. The bridge of the nose is very flat. Both inferior turbinals and the lower part of of septum covered with granulations, which are rather tough and easily bleed. The mother had two miscarriages before patient was born. Put upon mercury and K.I.

March 15th. Patient has not been seen since January 14th. Now has a discharging sinus from the lacrymal sac which is full of pus and blood. Both sides of the nose full of granulations. There is a perforation in the cartilaginous septum nasi.

March 23rd. Lacrymal sac removed under chloroform at home.

March 25th. Much swelling of both sides of the nose, and of both sides of the face, especially the left. Seems very ill, drowsy, and delirious. T. 98·9 F. Admitted to Hospital. When admitted it was soon seen that patient was not delirious but insane. The swelling of the face remained for some days, but was accompanied by no marked rise of temperature. A scab from the nose was inoculated upon culture media and staphylococci, streptococci, and xerosis bacilli were found. No Klebs-Loffler no Koch-Weeks, no gonococci, and no Morax-Axenfeld. The patient remained childishly insane for several months, but ultimately recovered, under treatment with thyroid extract, carried out by Dr. Webb Fowler.

The site of the sac excision did not heal well, and a fistula remained for months, but this ultimately closed, and when last seen the nasal condition was greatly improved. While in the Hospital a test injection of ·001 c.cm. of old tuberculine was given. The patient reacted violently, the temperature rising to 103° F.

Owing to the increasing insanity, the patient had to be sent home, and tuberculine treatment was not carried out. The reaction, however, rendered the diagnosis clear; the question for a long time was whether the cause was syphilis or tubercle. The reaction rendered the tubercular etiology almost certain.

Group III. Case Ia.*

Phlyctenular Conjunctivitis and Keratitis.

Mrs. H., age 47 (2386, 2975). First seen on *Dec. 30th*, 1908. At the outer and lower portion of the limbus of the left eye at IV o'clock there is a large elongated gelatinous-looking phlyctenule surrounded by thickened conjunctiva, which is very injected.

*This case, Ia, was last seen on October 26th, 1910. The cornea was almost *perfectly transparent* except for a small nebula centrally situated, V. = 2/60. It is almost inconceivable how, after such a severe ulcer and so thorough a cauterization with the galvano-cautery, such a recovery should have taken place. An optical iridectomy will now probably give quite good vision.

On Jan. 14th the phlyctenule, which had been treated with yellow oxide ointment, was no better, and a small ulcer 2 mm. in diameter was noticed for the first time opposite to it, and 2 mm. inside the corneo-scleral margin. Atropine was added to the yellow oxide and a firm pressure pad applied.

Feb. 1st. The condition was unchanged, the ulcer had neither healed nor spread, although it had been twice treated with pure phenol. Tn. Pupil only half dilated by the atropine.

Feb. 15th. The ulcer no longer stains. There is much injection of the conjunctiva and ciliary injection. The phlyctenular area is not so large but the conjunctiva round it is much thickened.

Feb. 22nd. The ulcer has reappeared and is slowly spreading. It now involves about one fifth of the cornea stretching in an oval from II o'clock to VI o'clock. The advancing edge is marked by a grey infiltration of the cornea. The pupil is still only partially dilated.

Feb. 26th. The patient was admitted and the whole ulcer with the infiltrated area of cornea thoroughly cauterised with the galvano-cautery. At the same time paracentesis was done at ten o'clock.

Feb. 27th. A test injection of 001 of old tuberculine was given. This was followed by no reaction.

March 4th. The ulcer is healing, eye much less injected.

March 10th. The ulcer, which had healed, now stains again at its central edge.

March 15th. Still stains. Cauterised with the actual cautery.

March 22nd. Again cauterised. Ulcer again healed.

May 10th. The ulcer is advancing again. Cauterised with galvano-cautery.

May 17th. Does not stain, signs of atropine irritation. Scopolomine ointment substituted.

May 24th. Advancing edge again stains. To start tuberculine treatment. The ulcer now occupies the lower 5/12 of the cornea.

May 24th.	1/2000 mgm.	T.R. injected.
May 29th.	1/2000 ,,	,, ,,
June 7th.	1/1000 ,,	,, ,,
June 14th.	1/1000 ,,	,, ,,
June 21st.	1/1000 ,,	,, ,,
July 5th.	1/1000 ,,	,, ,,
July 12th.	1/1000 ,,	,, ,,
July 19th.	1/1000 ,,	,, ,,
Aug. 4th.	1/500 ,,	,, ,,
Aug. 11th.	1/500 ,,	,, ,,
Aug. 17th.	1/500 ,,	,, ,,

No rise of temperature or any sign of re-action noted.

June 2nd. Has had two injections of T.R. The cornea still surrounded by an angry-looking arcola of ciliary injection, especially at the site of the original phlyctenule. The ulcer no longer stains, perhaps it has been influenced favourably by the tuberculine treatment.

July 12th. The ulcer stains all along the upper edge.

July 26th. Still stains. Cauterised again.

Oct. 25th. The ulcer which had been quiescent all August and October, again stains at the two ends of the old advancing edge, which is now advancing in a crescent shape. Again freely cauterised. This last attack conquered the ulcer, which finally healed, leaving about 1/5 of the cornea at the upper part untouched. The rest of the cornea remained transparent, but irregular and facetted. The original phlyctenule was of the type which I have come to regard as tuberculous in nature. The patient could not remain long enough in the Hospital to have further test injections after the first had caused no reaction. The result of the treatment with T.R. was, as far as could be seen, neutral. The injections did neither harm nor good.

Case IIa.†

Tubercular Toxæmia—Conjunctivitis and Keratitis.

Ivy C., age 10 (1808).

First seen *June 24th*, 1908. Had slight simple catarrhal conjunctivitis of the left eye. Had been inflamed for two months. The treatment prescribed was not effectually carried out, and patient did not improve.

July 20th. A small ulcer appeared at X o'clock near the periphery of the cornea. There was considerable circum-corneal injection.

July 27th. Admitted. Much photophobia and circum-corneal injection with severe lacrymation. The original ulcer has healed, but there is a localised patch of vascularised cornea at its original seat. The conjunctiva outside this area is much thickened, and when viewed with a lens is seen to be covered with numerous punctate nodular elevations. There are a few pin-point ulcers round the patch of pannus, which stains feebly with fluorescein. Put on ung. hydrarg oxidi flav.

July 31st. An injection of 001 c.c.m. of old tuberculine was given. A very slight reaction was noticed.

Aug. 17th. Received an injection of 1/2000 mgm. of T.R.

†*Oct.* 1910. Three large trachoma follicles discovered on doubly everting the lid. These were expressed under chloroform, and almost immediately all the irritation disappeared. It was a case of trachoma from the first, but these follicles had been overlooked.

Aug. 24th. A little vascularisation of cornea left, the injection is much less, and the condition of the eye is generally much improved. A second injection of 1/2000 mgm. given. The treatment with T.R. was continued for about six weeks, one injection a week of 1/2000 mgm. being given. There was never any reaction, general or local.

Dec. 23rd. There was a slight relapse which was treated on general principles.

March, 1909. Relapse.

May 5th. Relapse.

The condition of the conjunctiva was that which I have learnt to regard as indicative of a tubercular etiology.

The child was ill-nourished and neglected, and of a decidedly "strumous" type.

I was not able to decide that the treatment with tuberculine was of value in this case.

Case IIIa.

Phlyctenular Conjunctivitis. Corneal Ulcer.

Maggie B., (2845).

April 21st, 1909. First seen. Suffering from left phlyctenular conjunctivitis, and enlarged glands in the neck.

May 24th. The eye is still injected, there is much photophobia. The pupil is not dilated, as the atropine has not been effectually instilled. There is a small central ulcer in left eye.

June 2nd. No better. There is now a fresh outbreak of phlyctenulæ of right eye. The glands in the neck have not altered in size. The photophobia is as bad as ever. Decided to commence treatment with T.R. Injection as follows :—

June 2nd.	T.R. 1/2000 mgm.,			weight	4 st.	5¾ lbs.
June 7th.	,,	,,	,,	,,	4	7
June 14th.	,,	,,	,,	,,	4	0
June 21st.	,,	,,	,,	,,	4	0
July 5th.	,,	,,	,,	,,	4	8

June 7th. The eye condition improved.

June 14th. The eye looks better after treatment with T.R. The glands, which up to the present had not altered, are decidedly smaller.

July 12th. The eye inflammation is at an end.

Aug. 4th. Eyes normal.

Aug. 17th. Eyes well, glands as before. The phlyctenulæ were of the elongated type which appears to be characteristic of the tubercular variety. There was no definite improvement in this case until the T.R. treatment was commenced. Almost immediately an improvement was noted, and the eye rapidly got quite well, and remained so.

Case IVa.

Phlyctenular Conjunctivitis and Keratitis.

Harry B., age 6. (1014).

Oct. 7th. First seen. Suffering from very severe phlyctenular conjunctivitis with intense injection of both eyes and much photophobia. The phlyctenulæ are large and florid. Two on the right limbus, three on the left. These rapidly got well when treated with ung. hydrarg. oxidi flav. c atropine.

Admitted Oct. 12th. Oct. 16th. .001 mgm. of old tuberculine injected. Gave a smart reaction, no local injection

Case Va.

Phlyctenulæ and Corneal Ulcer.

L. S., age 10. (1803).

Jan. 22nd. First seen, is suffering from acute catarrhal conjunctivitis.

Jan 29th. A ring-shaped ulcer of the left cornea noticed, which stained faintly with fluorescein in its central portion.

July 1st. Now has large florid phlyctenule round the external aspect of the left cornea. Ulcer has not improved.

July 2nd, 1908. Admitted. A healthy-looking child well-nourished, but has a hectic temperature oscillating between 97·8 and 99·2. There is a deep ulcer in the central portion of the original scar. Outside this are the large fleshy phlyctenular masses already noticed. At VI o'clock, just inside the limbus is a large corneal infiltration, which however does not stain.

July 4th.—The ulcers no longer stain with fluorescein, but there is much injection of the eye, and the conjunctiva round the region of the ulcer is raised, and shows discrete nodules.

July 6th.—A determination of the tuberculo-opsonic index gave 1·21.

July 9th.—Injection of ·001 c.c. of old tuberculine. A very decided reaction followed, the temperature remaining raised for four days and reaching 100·4. There was no local reaction.
July 12th. The condition of the eye has manifestly improved.
July 14th. Eye much better, floor of ulcer filling in, the conjunctival hypertrophy has disappeared, and there is no injection of the eye.
July 31st. Except for the nebulæ left by the ulcers, the eye is now normal.
Aug. 26th. Had considerable blepharitis and conjunctivitis, which, however, rapidly improved under orthodox treatment.
Nov. 19th. A relapse of acute blepharitis. In this case there could be no doubt that a rapid improvement followed the injection of old tuberculine. The tendency to relapse is also present.

Case VIa.

Phlyctenular Keratitis.

H. R., age 5. (1790.)

June 17th. First seen with an attack of acute muco-purulent conjunctivitis. Rapidly cured by protargol treatment.
Nov. 25th. Appeared again. There was a phlyctenular ulcer of the cornea. Has had an inflamed eye for three weeks. A brother and two uncles died of phthisis. Has had several attacks of phlyctenular conjunctivitis. Admitted to the hospital. There is at IV o'clock, just inside the limbus, a fascicular ulcer surrounded by an aureole of infiltrated cornea. Treated with atropine and a pressure bandage.
Nov. 28th. Very much better, ulcer healed, all injection clearing up. This patient was admitted for the tuberculine test, but the temperature was so typically hectic that it was not carried out. This hectic fever and the family history of phthisis rendered the diagnosis of a tubercular toxæmia very probable.

Case VIIa.

Corneal Ulcer.

E. C., age 3. (2381.)

Dec. 28th, 1908. Has been suffering from an inflamed eye for ten days. There is at VIII o'clock a large sloughing ulcer of the cornea just internal to the limbus, surrounded by widespread infiltration of the cornea. There is severe circumcorneal injection. Admitted, treated with atropine and pressure bandage. Rapidly improved, and discharged as cured.
Jan. 21st. Re-admitted with a large ulcer in the original scar.
Jan. 26th. ·0005 c.cm. of old tuberculin injected. No reaction.
Jan. 31st. ·001 c.cm. injected. No reaction.
Feb. 7th. ·002 c.cm. injected. There was a moderate eaction. The temperature rose to 101·6 F. Discharged cured.

Case VIIIa.

Phlyctenular Conjunctivitis and Keratitis.

E. B., age 7. (1673).

May 13th. First seen. Suffering from severe phlyctenular conjunctivitis and keratitis. There is much blepharospasm and photophobia with constant and profuse lachrymation. The child is a poor strumous lad.
May 15th. Admitted. Treated with ung. flav. c. atropina with oleumm orrhuæ and syrup ferri phosph. co.
May 20th. Very much better, opens his eyes, ulcers healed, less injection.
June 2nd. Still much photophobia, rather worse again. Kept in a month and finally discharged very much improved.
July 16th. Has relapsed.
July 18th. Injected with ·001 c.c.m. old tuberculine, no reaction.
July 23rd. ,, ,, ·002 ,, ,, ,,
July 27th. ,, ,, ·004 ,, ,, ,, This caused a moderate general reaction, and probably a local one, the local symptoms appearing to be slightly aggravated.
June 30th. Very much better in every respect. Discharged.
Aug. 5th. Injected with T.R. 1/2000 mgm.
Aug. 19th ,, ,, ,, ,, ,,
Aug. 27th. ,, ,, ,, ,, ,, Is in every respect very much better. The original injections had a very marked effect in clearing up the photophobia and injection of the eye.
Feb. 3rd. A relapse. There is a large phlyctenule surrounded by local injection. Rapidly improved with ordinary treatment.

Case IXa.

? Tuberculide of Conjunctiva.

P. C., age 44. (2664).

March 8th, 1909. First seen. Last December he burnt his eye at the gas works. It never got quite well. Now has a large gelatinous-like mass at the inner aspect of the left cornea. It encroaches slightly upon the cornea and the surrounding conjunctiva is greatly injected. This mass of tissue steadily increased in size and the general injection became more intense in spite of regular treatment. Patient's daughter (Case I.) has interstitial keratitis and a very similar condition of the limbus.

July 7th. No better.

August 16th. Admitted. The growth, which was held to be a tuberculide of the conjunctiva, is now very large, measuring about 10 mm., is vertical diameter, and 6 mm. across. 1/5 of its area overlaps the cornea.

August 20th. ·0001 c.cm. of old tuberculine injected. No reaction.

August 25th. ·0002 c.cm. ,, ,, ,, There was a smart general reaction. The temperature rose to 101° F.

August 27th. The growth, which was now regarded as of tuberculous origin, was dissected off down to the sclera, which was not eroded, and was shaved off the cornea. The corneal site was well cauterised with the galvano-cautery, and the whole defect covered with a flap of conjunctiva.

September 17th. The eye looks normal. There is no sign of any recurrence, and save for a very small area close to the periphery, the cornea is clear. There is no injection whatever. Histological examination showed the growth to be a papilloma. No giant cells or tubercles were present.

Case Xa.

Phlyctenular Ulcer.

M. C., age 1. (3692)

Nov. 24th, 1909. First seen. The eye has been inflamed for fourteen days. There is now a superficial ulcer just within the limbus at III o'clock. This is surrounded by a horseshoe mass of granulation-like tissue which occupies the whole cornea between the ulcer and the limbus, and encroaches upon the ocular conjunctiva. There is a small hypopyon. Although the patient has been under medical care for some days, the pupil is not dilated. Patient was at once admitted, placed under chloroform, and the actual cautery freely used to the ulcer and to the surrounding granulation tissue on the cornea

Dec. 6th. The treatment has been effectual, the ulcer is healed, and the eye is much improved

Dec. 6th. ·0005 mgm. of old tuberculine injected.

Dec. 10th. ·001 ,, ,, ,, ,,

Dec. 14th. ·002 ,, ,, ,, ,,

In no case was there any reaction. The result of the tuberculine test proves that the condition which was thought to be due to a tuberculo-toxæmia was not in any way associated with tubercle.

Jan. 26th. Still much injection of the conjunctiva. There is a large macula in the site of the old ulcer. The injections of tuberculine have had no action upon the disease.

Case XIa.

Fascicular Ulcer, Phlyctenular Type.

J. H., age 11. (3780)

Jan. 12th, 1910. First seen. Eye has been inflamed for three weeks. There is a small ulcer half way between the pupil and V o'clock. A leash of vessels runs from it to the limbus, and there is at this spot a localised area of injected conjunctiva.

Jan. 19th. A second ulcer has appeared almost in the centre of the cornea, which is also connected by a leash of vessels with the limbus at II o'clock. The first ulcer has healed.

Admitted. The second ulcer stains deeply.

Jan. 19th. The child received an injection of .001 mgm. of old tuberculine, which was repeated on

Jan. 29th .002 being then injected. No reaction followed either injection.

Jan 24th. Ulcer cauterised with galvano-cautery.

Jan 26th. Ulcer healed.

Feb. 2nd. Discharged cured.

Case XIIa.

Phlyctenular Conjuntivitis.

V. P., age 12. (3579).

Nov. 2nd. Came to Coventry Hospital. Has been treated previously for phlyctenulæ. Has lamellar cataract and is hypermetropic. Now has a recurrence of his previous condition. There is a

moderate-sized phlyctenule on the limbus of the left eye at V o'clock. His great grandfather, grandfather, and three uncles died of phthisis.

Dec. 8th. Has been treated with ung. hydrarg. oxidi flav., and is now almost well.
Feb. 3rd. Admitted for tuberculine test.
Feb. 5th. ·001 old tuberculine injected: no reaction.
·002 ,, ,, reacted.

The temperature rose to 101·2 F., and the child developed a sore throat. There was a slight local reaction of the left eye.

Case XIIIa.

Phlyctenular Conjunctivitis.

B. R, age 6. (25 L.)

April 14th, 1910. Admitted to the Warneford Hospital, Leamington, suffering from phlyctenular conjunctivitis and keratitis. In addition, there is a scar of a chronic abscess in the neck, probably from a tuberculous gland, and one on the wrist from a superficial abscess. The child has no enlarged glands, and is in other respects quite healthy. Three injections of old tuberculine 001, 002, and 005 c.cm. were given on April 27th, May 2nd, and May 9th respectively. There was no trace of any reaction, either general, at the site of the injection, or in the eyes. This child must therefore, even if originally tuberculous, have completely got rid of the tubercle bacilli and their products.

It is however possible that this child would have reacted to *bovine tuberculine*. At the present time (Oct., 1910) I have in the Coventry Hospital a boy with a typical tubercle on the iris in the iridic angle at VI o'clock. He has enlarged cervical and mesenteric glands, and apical signs. He failed to react to ordinary old tuberculine, but when bovine tuberculine was tried he reacted violently. He is now being treated with bovine tuberculine, and the tubercle is growing smaller, the iris is regaining its gloss, and vision is improving. This interesting case is only noted here. The full notes will be published in due course.

SOME UNUSUAL EFFECTS OF EYE-STRAIN.

BY

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IT will be generally admitted that a considerable percentage of victims to headache and neuralgia fail to disclose any positive evidences of actual disease, in spite of the greatest care on the part of the family medical adviser in searching for a cause. The affected nerve trunks, the brain itself or its coverings, the heart, the lungs, the kidneys, the liver, the stomach, and the intestine seem in most cases capable of performing their normal functions, save when some temporary disturbance (not generally referable to any definite cause) occurs simultaneously with, or prior to, one of these paroxysmal attacks.

Not infrequently, it happens in the ordinary office work of the ophthalmic practitioner, that symptoms not usually accepted by the general profession as due to eye-strain, are plainly shown to be sometimes so produced. The relation of cause to effect is so curious a thing, and so much a matter of tradition in the average lay mind, that no possible causal connection between their symptoms and their eyes ever occurs to the patient until the relief of their eye-strain proves it beyond all peradventure. Even then they are apt to ascribe the disappearance of all but their immediate eye symptoms to some absurd extraneous influence. To the painstaking ophthalmologist this is so much a matter of almost daily repetition, that it were "carrying coals to Newcastle" to bring this matter to his attention. But to the general profession and to the lay mind, it will need much iteration and reiteration to bring about a belief in the postulate, for instance, that a cervico-brachial neuralgia could be symptomatic of eye-strain, that riding in tram-cars was simply impossible to a patient because of an eye-strain, that mental depression, intellectual confusion, and entire change of the viewpoint of one's life, could follow upon so seemingly small a cause.

This, however, is the contention here brought forward, in testimony whereof the following cases are submitted in evidence :—

CASE 4773.—*General neurasthenia, occipital and sick headache, inability to ride in the tram-cars, relieved by proper correcting glasses.*

Miss V. M., aged 22, was referred to me in July of 190-, by her uncle who was also her general physician. He stated that for some time he had been seeking for a cause for her vertigo and headache, as she had been refracted not long before without much relief of her symptoms. She was a tall, thin, wiry, nervous, and poorly nourished young woman, whose health had been more or less precarious for two or three years past. She had been "headachy" all through her schooling. Any attempt at near work brings on severe headache, and if persisted in nausea and vomiting follow, and at such times she is hyperesthetic and afflicted with insomnia. She is hardly ever free from some dull headache, generally left temporo-occipital. To ride farther than five or six squares in a tram-car is simply impossible. She feels that she must get off the car, even if she has to jump. Both eyes were normal anteriorly, likewise the pupillary reactions.

She was wearing R. + ·50C. 90° L. + ·75C. 90°. With these her vision was the same as when uncorrected, namely, 5/6. Her muscle balance with the Maddox rod was 2° of exophoria and 6° of right hyperphoria. On search for diplopia with a small one-candle electric light, it was soon found that there was well marked double vision in the left upper field with right image higher. When the eyes were carried into this part of the field the secondary associated action of the right inferior oblique was plainly to be noted. The true condition (at first blush presenting the clinical picture of right hyperphoria) was shown to be a congenital paresis of the left superior rectus with left hypophoria. Both eye-grounds exhibited the suffused nerve head and fluffy choroid of high grade eye strain. She was carefully measured under the prolonged influence of hyoscin hydrobromate, and her refraction shown to be R. + 1·00 sph. +·75 cyl axis 100°. L. + 1·25 sph. + ·90 cyl. axis 80°. The spherical quantity was reduced, and there was ordered for constant use :—

R. + ·50 sph. + ·75 cyl. axis 100°.
L. + ·75 sph. + ·90 cyl. axis 80° combined with a 2° prism base up.

Training of her defective convergence faculty was also instituted with prisms, bases out.

One month later she reported that she was sleeping finely, could use her eyes at reading and sewing for an hour comfortably and felt much better in the tram-cars.

Six months later she could ride as far as she chose in the tram-cars, could read and sew a couple of hours easily, was practically free of headache, and was really enjoying life.

CASE 1794. J. L., aged 12, male, brought by his mother because his eyes and head were continually troubling him and he was developing the habit of blinking his eyes. He also complained of vertigo and nausea. The patient was a lanky, flabby youth, rather undersized for his years. He presented no disease of any kind that could be made out. His eyes were normal anteriorly and interiorly save for the woolly choroid and generally congested fundus so often found in patients with such a history. His uncorrected vision was 5/30 in each eye, and with his then correction was 5/15 in each eye. Under hyoscin hydrobromate, his refraction equalled :—

R. +1.50 sph. +2.25 cyl. axis 105° = 5/9
L. +1.00 sph. +1.50 cyl. axis 75° = 5/9

These were ordered to be ground in a No. 3 smoked glass, and atropia was used in his eyes twice daily all the summer. At the end of that time he had lost his nervousness, his blinking, his vertigo, and his headache; and his vision with the glasses was 5/7. They were therefore prescribed for him in clear glass. Each summer since then (for eight years) he has returned for refraction. To day his refraction is :—

R. —1.00 sph. + 3.25 cyl. axis 120°
L. —1.00 sph. + 2.50 cyl. axis 75°

with which he gets full normal vision. It will be observed that in spite of careful mydriatic refraction each summer for eight years, his ocular tunics have stretched so much that he is now going through the turnstile of mixed astigmatism. Had his eyes not been carefully watched, it is morally certain that by this time, he would have been highly myopic and in a measure incapacitated for the work he is now doing at one of our large universities. He is to-day a broad shouldered, lusty, young giant of six feet one inch, in perfect physical condition, and hardly knowing what a headache is.

CASE 2535.—E. F., female, aged 11, was brought to me in January of 1901 by her mother, who stated that the child had always been a nervous fidgety, pallid, lank child. She suffered almost constantly from occipital headache, had a capricious appetite, was taking medicine all the time, and had a hard time in keeping up with her class at school. The patient was undersized and so thin and anæmic that she was almost diaphanous. The muscles were flabby, the eyes deep set, and complexion was pasty. The family medical adviser stated that clinical study of her case revealed no cause for her symptoms. She was wearing :—

R. + 3·00 sph. + 1·00 cyl. axis 90°
L. + 1·00 sph. + 0·50 cyl. axis 90°.

with which her vision was : R. 5/15 : L. 5/7. Under atropin her error measured :—

R. + 4·00 sph. + 1·50 cyl. ax 95° = 5/9.
L. + 1·50 sph. + 1·00 cyl. ax. 84° = 5/5.

These were ordered for her (less a + ·75 sph.) and atropia was used once daily for a month. At the end of that time her vision was 5/7 in the right eye and 5/5 in the left eye. She was kept out of school the remainder of that school year, and during the summer atropia was used in her eyes once daily. The following September she went to school, remained there the whole year and came to me the June of the next year following, when the mother reported the child as having been absolutely free of her choreiform movements, nervousness, and headaches; also that it was the first year she had ever been at school that she did not break down in the spring, and that it was the first whole school year she had ever gone through without taking any medicine at all. In June of 1906 she was again refracted as follows :—

R. + 3·00 sph. + 3·00 cyl. ax. 105° = 5/6.
L. + 1·50 sph. + 2·50 cyl. ax. 75° = 5/5.

which she is wearing with perfect comfort. She is now 17 years of age, 5 feet 8 inches tall, and said by her mother to be by far the sturdiest member of her numerous flock.

Case 4903. W. A. W., male, aged 38, married, manager of a large mercantile concern, came to me September 1st, 1906, saying that for years he had been more or less subject to sick headaches, principally occipital and to an intractable intestinal indigestion for which he had done everything that could be devised by medical men in this day and generation.

He was a fairly well nourished man of the mental type who overworked villainously and who neither smoked, chewed, nor drank. His whole life was devoted to his business, which he worshipped with all his might, all his soul, and all his strength. The vision was 5/5 in each eye. His accommodation and muscle balance were normal. His optic nerves were a trifle off colour, his macular arteries far too wavy, and the veins suggested pressure where they were crossed by the arteries. He was warned of the possibility of beginning arteriosclerosis in his retinal vessels. Under a mydriatic, his refraction proved to be :—

R. + ·50 sph. + ·50 cyl. ax. 180°
L. + ·50 sph. + ·50 cyl. ax. 180°

He was ordered for constant wear in both eyes + 0·50 cyl. ax. 180° and admonished to slow his commercial pace somewhat. He then went to his home in a distant city and I have not seen him since, but one month ago (which was five months after he put on his glasses) he wrote me as follows : "When I arrived home, although deeply skeptical as to the correctness of your ideas, I put on my glasses At the end of a week I was conscious of a distinct lessening of the feeling of tension that had almost become a part of me. My headaches are gone and my indigestion with them. I eat pretty much what I please, and feel several years younger in spite of the fact that for the past five months my commercial and financial responsibilities have been much heavier than ever before." In order that the proper value may be placed on the foregoing letter, I may say that the patient is a hard-headed matter-of-fact business man of few words and rather phlegmatic disposition.

Case 4853.—Mrs. E. G., aged 40, widow, directs a large establishment of some 20 to 25 girls. She was sent to me in September, 1906, with a history of dull headache, abnormal physical tire, insomnia, beginning nervous irritability, and an obstinate cervicobrachial neuritis for which she had been treated for six months, but of which nothing was said at the time. The patient was a tall, superbly proportioned, active, sanguinely tempered woman, of well regulated life-habits. Her vision, accommodation, muscle balance, and eye grounds were normal. Under cycloplegia (hyoscin hydrobromate), her refraction equalled :—

R. + ·62 sph. + ·25 cyl. ax. 180°
L. + ·62 sph. + ·25 cyl. ax. 180°

For distance the cylinders only were advised, and for near work :

R. + ·62 sph. + ·25 cyl. ax. 180°
L. + ·62 sph. + ·25 cyl. ax. 180°

Three months later she reported, saying that her headaches and other symptoms had flown away and with them her cervico-brachial neuritis. She was anxious to know whether the correction of her ocular defect had had anything to do with the disappearance of her cervico-brachial neuritis, and was told that it might have. Within the last month she tells me that once in a great while the nerve grumbles a little bit, and after artful questioning, I found she was not wearing her distance glasses much.

Case 4404.—Miss E. M., aged 25. Came November 23rd, 1905, saying that she was troubled almost constantly with dull occipital headache, much aggravated after car riding, shopping, etc. (panorama headache), and especially after reading and sewing. Indeed, after the latter she would often have vertigo and nausea, and felt as though her head would burst. She was morose and depressed, and after much questioning I wormed from her the confession that because of these peculiar head symptoms she had often feared lately that she was losing her mental balance. The patient was a sensible country girl, of comely but distressingly thin appearance, poorly nourished, and markedly neurasthenic. Suspecting an affair of the heart, this subject was adroitly led up to, but she laughed and frankly stated that she was heartwhole. Her eyes were normal anteriorly, and there was nothing abnormal about her vision, accommodation, muscle balance, or eyegrounds. Under cycloplegia, her eyes measured as follows :—

R. + 1·00 + 0·12 cyl. ax. 45°.
L. + 1·00 + 0·12 cyl. ax. 135°.

It was with just a little lack of faith that I told her there was some doubt whether glasses would be of any service to her, but that the experiment was worth trying. She was therefore ordered :

R. + ·62 sph. + 0·12 cyl. ax. 45°
L. + ·62 sph. + 0·12 cyl. ax. 135°

for constant wear.

I saw nothing more of her until two months ago, when she appeared in my office saying that within six months of the time she had put on the glasses she gained 18 pounds and lost all her distressing symptoms. Then three months before she came back, her glasses had broken, and in her pride and improved health she had flattered herself that she could get along without them, but her symptoms came gradually back one by one, and she thought it wise to return for a re-measurement.

Case 2001. D. A., aged 35, married, lawyer, came to me October 14, 1898, saying that for some years he had had much photophobia, occasional transient vertigo, drowsiness, and mental confusion after near work, and chronic intestinal indigestion. He was completely devoted to his profession and used his eyes hard. He had never used glasses at all. The patient was of fairly good build, pretty well nourished, and extremely moderate and regular in his life habits. His eyes were normal anteriorly; his vision was R. 5/5 L. 5/9. There was also exophoria (defective convergence) of two degrees. The eye grounds showed rather suffused nerve heads and much engorged lymph sheaths with a fluffy choroid. Under cycloplegia his refraction equalled :—

R. + ·50 sph. + ·25 cyl. ax. 45°
L. + ·25 sph. + ·75 cyl. ax. 180°

He was ordered the foregoing less +·50 sph. on account of his exophoria ; and as his prism convergence was but 6 to 8 degrees, prisms, bases out (after Gould's method), were directed to be used for the training of his convergence faculty.

Four months later he came back saying that the glasses were very helpful to him in all near work but he had not been wearing them for the street. He was told that if he wished to be free of his symptoms he should wear them constantly. To this he demurred, objecting that he did not think my statement could be proven. He passed from under my observation. Two years later I met him on the street wearing glasses and reminded him that I had said he would come to it, whereupon he answered that he had put on his glasses for the street, experimentally, about two months after he left me, and he had been wearing them ever since with the most complete relief to all his symptoms.

Case 2121. Miss S. W., aged 50, came first under observation April 20th, 1899. Her history was that she had been the subject of nervous prostration for six months, three years prior to her coming under observation. Since that time there had been more or less constant headache, photophobia, temporal neuralgia, and vertigo, with gradually increasing nervous irritability and inability to use the eyes. A sister has had agonizing headaches for years, also neuralgia, and another sister from her youth up to the time of her death. The father, it was learned, had been the victim of sick headaches. I merely mention this in passing because we as ophthalmologists are oftimes told by general practitioners that in this so-called hereditary form of sick headache, ocular defects are not often the exciting cause.

The patient was a tall, frail woman, who had led a sedentary life. Her eyes showed no abnormality anteriorly or interiorly. The vision was R. 5/5 ; L. 5/9, and there was exophoria of 3 to 5 degrees as in the preceding case. Indeed, these two cases almost parallel each other. There was additional muscular error in the presence of a right hyperphoria of one degree. Her eyes were measured without a cycloplegic, and she was ordered for distance :—

R. ·25 cyl. ax. 90° ; 3/4 degree prism base down.
L. —·25 sph. + ·37 cyl. ax. 180°

For near work plus 1·50 D. sphere was added, and prism training of her convergence was instituted. I saw nothing of her for eight months, when she came in one day simply to say that she had put on 22 pounds, had forgotten what headache, neuralgia, and nervousness were, and she could use her eyes indefinitely. And all this in spite of the fact that for four months she had nursed her sister through an almost fatal illness.

Comments.—It is needless to pile up more of such histories, as the same kind of puzzling cases appear from time to time in the office of every painstaking ophthalmologist, but the change is so silently, so undramatically, brought about, that small noise results in the community.

Let those who would raise the eyebrows of incredulity at the postulates herein set forth remember that of the twelve great cranial nerve trunks all of four, and part of two others, as well as a considerable portion of the sympathetic nervous system, are devoted to the proper working of the eye. This bit of mathematical physiology may help to a realization that Nature has marked this seemingly tiny globe of human machinery as one of its chosen organs. Moreover, such case-histories should remind us all to despise not the day of small things.

CLINICAL MEMORANDUM.

NOTE ON A CASE OF OCULAR ALBINISM IN A DARK-HAIRED INDIVIDUAL.

BY

ERNEST THOMSON, M.D.

SURGEON TO THE GLASGOW EYE INFIRMARY.

THE rarity of the condition about to be described is the excuse for publication.

Rebecca E., aged 11 years, a native of Co. Tyrone, was brought to the Glasgow Eye Infirmary on June 24th, 1910, on account of very defective vision since infancy. The child had dark hair, eyebrows, and eyelashes, and a darkish, muddy complexion. It was noticeable at a glance that the pupils did not look black, and investigation showed that the eyes were perfectly albinotic. In the dark room, light from the ophthalmoscope was reflected through the irides; no pigment could be seen in the fundi; there was myopia of approximately 5D.; and nystagmus was present.

The family history, perhaps, was not very trustworthy, but nothing could be elicited as regards eye defect in the family or ascendants; consanguinity in marriage was not admitted.

The V.A. was improved with −4D. sph. from R. $\frac{24}{36}$, L. $\frac{24}{36}$, up to R. and L. $\frac{6}{36}$.

I much regret that it is impossible to show the readers of THE OPHTHALMOSCOPE the actual hair, a lock of which I obtained, but can assure them that after washing and cleaning by a hairdresser, it is distinctly what would be called "dark" brown. I did not see the child stripped, but her aunt, who brought her, assured me that the hair on other parts of the body was similar to that of the scalp.

TRANSLATION.

A RARE FORM OF TERATOMA OF THE ORBIT.*

BY

DR. G. MIZUO,

OF OSAKA, JAPAN.

MIZUO'S interesting case of orbital teratoma is described as follows:—

A male child, 54 days old, was brought to me at the hospital in Osaka, on May 26th, 1906. There was nothing exceptional in the previous history. The pregnancy had been normal, and the child had been born in the tenth month. Delivery had taken the ordinary course. The mother had already given birth to eleven normal children.

When the boy was born, a small oval swelling of the conjunctiva was noticed in the left palpebral aperture. It soon began to grow and to project from between the lids, and measured 2 cm. by 3 cm. A swelling appeared in the lower lid and soon attained the size of a small hen's egg. The upper lid also became

* Abridged translation from *Archiv für Augenheilkunde*, März, 1910.

slightly swollen, apparently owing to pressure from below. The child was seen by a doctor on the second day, who removed the swelling, *i.e.*, the conjunctiva of the fornix and globe. He also incised the lower lid, and evacuated a quantity of hazy fluid ; 40 days afterwards, the swelling having become larger, the doctor incised it again. This time some brownish purulent

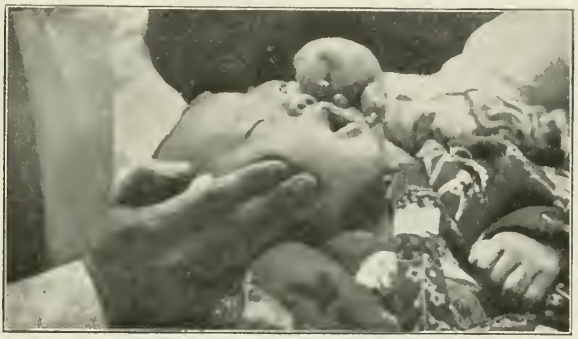

FIG. 1.—Tumour photographed from behind.

fluid escaped. The wound did not close, and ten days later, a small, tumour-like body presented in it. This was a small left fœtal foot. The tumour began to grow very rapidly, so that two days afterwards, the mother brought the child to me.

Development and nutrition good. The face appeared rather paler than normal. No abnormalities about the head and body. The right eye was normal, but below the left one there was a pink tumour, resembling a fœtus, the size of a small fist, covered with fine downy hair and attached to the deepest part of the orbital cavity by means of a pedicle, like an umbilical cord, passing through the skin incision. The left palpebral aperture measured 3 cm., *i.e.*, 1 cm. more than the right one. The skin of the upper and lower lids was rather lax and pendulous. The globe was slightly proptosed and displaced upwards. The movements downwards were interfered with considerably. The left optic disc was pale (slight atrophy). The left light reflex was rather slow, otherwise there was nothing abnormal about the eye ; 1 cm. below the margin of the lower lid there was a crateriform hole lined with granulation tissue. It measured 3 cm. in diameter, and had indented edges. This hole communicated with a large space in the orbital cavity. The limits of the space can be defined quite easily with the finger. The floor is formed by the floor of the orbital cavity. It has a smooth surface, but is displaced considerably both downwards and outwards. Compared with the right side, the left orbital cavity appears very large and deep. The deeper parts of the cavity were filled up with the large pedicle of the tumour, so that one could not ascertain its size. The space is limited above by the globe of the eye, but it extends both inwards and outwards above the eye.

The tumour itself has an almost perfect shape of a fœtus. Its length from the top of the head to the buttocks is 70 mm. The circumference in the region of the latter measures 80 mm. With the exception of the head, the body is covered with a cherry-red skin, with fine downy hair. The diameter in the pelvic region is 80 mm. Near the head there is some

fairly long hair. The sole of the foot is furrowed as usual. The head had no covering, and consisted of a friable, yellowish-grey, brain-like substance. Near its lower limits there were some elastic masses resembling ears, which broke up during examination. Below, on each side of the head, there was a conical protuberance, about 15 mm. high, which appeared to be the rudimentary representatives of the upper extremities. The right arm is better developed than the left. A cylindrical pedicle, resembling the umbilical cord, was attached to the centre of a region corresponding to the abdomen. It measured 20 mm. in the vertical diameter and 16 mm. in the horizontal diameter. This pedicle passed below the left eye into the orbit, and perhaps to the base of the cranium. The surface of the upper part was covered with epithelium and cholesterin ; the deeper part had something like a diphtheritic

FIG. 2.—The extirpated Tumour.

membrane covering it. On palpation, the pedicle seemed to consist of several elastic tubes. On the inner side of it a fleshy substance could be felt, through which a sound could be passed upwards (intestinal opening). On the outer side there was a slit-like opening through which the sound could also be passed upwards. At the lower end of the body there is a structure resembling a penis with a Y-shaped opening. The perineum and the lower extremities are fairly well developed. Both feet are well developed with five toes and toe-nails. The lower extremity, however, is not distinctly differentiated into a thigh and a leg.

I think from the above we may regard the condition as a form of twin development, in which the child is the autosite and the tumour a parasite.

I removed the tumour, because the child became feverish and ill soon after admission. Later, the mother reported that the wound had healed, the child was doing well, the squint had almost disappeared and some vision seemed to be retained in the eye.

Anatomical Examination.

A radiogram showed two long bones lying side by side in each leg and extending to the ankle-joint. This probably represented the tibia and fibula. Three or four ossified parts were also seen near the upper end of the spinal column and round the buccal cavity.

The tumour was halved in the saggital line, and then the following appearances presented themselves on section:—

The cephalic portion consisted chiefly of cerebral substance: posterior and inferior to this there was a sharply defined body resembling a cerebellum. Three cartilages lay in the region of the base of the cranium, two of them already ossified. These three cartilages are followed by another large one, also undergoing ossification. Below this there is a hook-shaped cartilage, like a sacrum, the upper part of which is ossified. At the base of the cranium in front there is an irregular cavity with which is connected a tubular stomach-like cavity. Microscopically, the first has the structure of a pharynx, and the latter that of a stomach. Below the stomach there are two large glandular structures and large vessels and nerves. Situated above the sacrum and the next bone, there are two well developed spinal ganglia. Near the vertebræ there are three small glandular structures and large bundles of striated muscle fibres. On the inner side of the sacrum there is a small glandular mass from which some tubes run to the apex of the penis. The skin is fairly thick and particularly well developed. The body is formed, in the main, of subcutaneous cellular tissue.

Microscopic examination of the pedicle showed chiefly sections of the large and small intestine, large vessels and nerves, and loose embryonic connective tissue.

Microscopic Examination.

Cephalic Portion.—The cerebral substance consists almost wholly of glia cells and their processes and ganglionic cells. It contains numerous bloodvessels, which have thin walls and are highly congested. At many places the vessel walls are infiltrated with round cells. In the cerebrum in front of the cerebellum there are small necrotic areas surrounded by connective tissue. The substance forming the cerebellum is pretty well defined. It contains a slit-like canal lined with a single layer of high columnar epithelium. Capillaries start from this canal and run in a radial fashion in all directions. The ganglionic cells are particularly numerous in the cerebellum. The cartilage at the base of the cranium consists of hyaline cartilage, which in two places is commencing to ossify. The process of ossification is very regular. In some places bone-marrow has been completely formed, as well as Haversian canals. Below and in front of these cartilages, there are two or three cartilages surrounding an irregular cavity representing the pharynx. On the inner side of these cartilages were many tubular glands resembling salivary glands, they have long ducts leading into the pharynx. The cavity is lined with a single layer of high columnar ciliated epithelium, which is continuous with the mucous lining of the stomach.

The Body.—The vertebræ consist of primary cartilage in which ossification has proceeded far: the Haversian canals and the bone marrow are fairly well seen. In the neighbourhood there are lymphatic glands, spinal ganglia, and many striated muscle fibres, which are inserted into the bone. In the spinal ganglia there are numerous very well developed ganglionic cells and nerve fibres, which are identical with normal tissues of this kind. In the sacrum ossification has already begun in the upper part. The glandular substance at the tip of the sacrum consists of a tubular tortuous gland, covered with a single layer of clear epithelial cells. The same glands are found in the lower part of the pedicle near the mons Veneris, and appear to open into the central canal leading to the apex of the penis. Situated in front of the "vertebral column" there are many large vessels, nerves, and lymphatics.

Skin.—The skin is completely developed—hair follicles, erectores pilorum, sebaceous and sweat glands, all are well formed. The subcutaneous cellular tissue, especially the panniculus adiposus, is very well developed, which accounts for the plump form of the tumour.

The Pedicle.—In the stomach the pyloric and gastric glands are very well seen. There is also a structure resembling an embryonic pancreas. The muscular layer of the stomach wall is well developed. The duodenum can be traced to the small intestine and stomach respectively. The duodenum and small intestine contain villi, Lieberkühn glands, and lymphatic glands. The muscularis mucosæ, the circular and longitudinal muscle fibres can all be distinguished, also Auerbach's plexus between them, with fairly large ganglionic cells. The small intestine divides into two parts, one of which opens before the other on to the inner surface of the pedicle. At the orifice the mucous membrane has the appearances of the mucosa of the large intestine. It extends for some distance along the surface of the pedicle and forms a fleshy mass described above.

The Glands.—Large lymphoid glands are seen below the stomach; one of them resembles the spleen, and contains many blood-vessels; the others look more like real lymphatic glands. A gland in front of the sacrum opens into the so-called ureter. Two other glands are near the base of the pedicle; one of them resembles the prostate, and the other has a branching structure.

Mizuo regards the tumour as belonging to the first of the following four groups of twin formations: (1) epignatus and allied forms; (2) craniopagus parasiticus; (3) Janus parasiticus; (4) dicephalus parasiticus.

The present tumour is not an epignatus, strictly speaking, because it is not attached to the palate, but belongs to the group called by Marchand prosopopagus, *i.e.*, attached to the face (*προσοπον*). The author prefers to call it "orbitopagus parasiticus." PERCIVAL J. HAY.

REVIEW.

PARINAUD'S CONJUNCTIVITIS*

BY

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PARINAUD'S conjunctivitis, so-called because discovered and described in 1889 by Parinaud, of Paris, is a rare disease. To date, but sixty cases or thereabouts have been reported in ophthalmological literature. Goldzieher reported a case in 1882, which he called "lymphadenitis conjunctivæ," the symptoms of which, however, correspond to those of the affection under discussion. But in his subsequent writings upon the disease he does not classify it with the cases of Parinaud's disease observed by him.

Definition.—A self-limited, unilateral, infective inflammation of the eyelids, with the formation of large polypoid granulations on the conjunctival surfaces thereof, together with marked swelling of the glands of that side of the face and neck.

* Read at the Fifteenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology held at Cincinnati, Ohio, Sept. 19th 21st, 1910.

Cause.—Parinaud believes it to be due to animal origin. This view is not shared by such observers as Gifford. However, K. Hoor, in an article dealing with the forty-four cases reported to that date, believes that in two-thirds of them there was opportunity for animal infection. One of Barck's cases was a telegraph operator with no such opportunity for infection. David Webster, from his case, that of a young lady, does not believe the disease to be of animal origin.

The disease has been observed only in the temperate zones, and most frequently in the autumn time.

The sexes are affected about equally.

It is liable to occur at any age; the youngest case on record is that of Schoeler, the patient being aged one and one-half years. The oldest is sixty-one. Seventy per cent. of the cases occur under twenty-six years of age.

The right eye is more frequently affected, because people, as a rule, are right-handed, and thereby carry the contagion.

Pathological anatomy.—As to the gross anatomy, we are confronted with a marked swelling of the eyelids of one eye, so pronounced as to close them together. From between the eyelids exudes a muco-purulent discharge, which is usually slight in quantity but at most moderately profuse. If profuse, it rapidly becomes scanty. The swelling of the glands is quite characteristic, beginning with the preauricular gland and extending downward and involving the submaxillary, parotid, and cervical glands. In a case reported by Barck, the preauricular was separated from the submaxillary and cervical glands, each being as large as an apple.*

Eversion of the eyelids shows a characteristic swelling of the underlying conjunctiva into large granulations, which are polypoid in character. Sometimes, these are found on the ocular conjunctiva, although rarely. The cornea is but seldom involved. The case to be reported later in this communication showed, however, corneal involvement. The only other cases with such involvement were by Rohmer and Basserres-Poujol respectively.

Microscopically, Morax and Manouelian made an examination of a case of Chaillous and Toufesco, by taking bits of the tissue of the affected conjunctival membrane, and found the "subepithelial zone of diffuse infiltration, quite different from the infiltration of trachoma, and an absence of the giant cells and bacilli of tuberculosis."

Verhoeff and Derby thoroughly investigated this disease, and found the cellular infiltration to consist of phagocytic and lymphoid cells, with marked cellular necrosis. The lesion was superficial. Goldzieher found the "excrescences to consist of a net-like tissue in a condition of high-grade œdema, and to differ from trachoma in the absence of round cells, which form the trachoma follicles. In both conditions the surface epithelium tends to proliferate, but in trachoma it forms narrow, fungi-like processes, the trachoma glands, while in lympho-conjunctivitis it penetrates in irregular masses, and the cells show a tendency to mucoid degeneration." Reis disagrees with Verhoeff and Derby, as quoted above, in that he does not find the subconjunctival tissue in a state of necrosis. However, Sinclair and Shennen in reporting a case, confirm practically the observations of Verhoeff and Derby in that they find "the formation and the subepithelial tissue of a variety of granulation tissue, crowded with cells and containing numerous young blood vessels. There were also alterations in the epithelium, with superficial erosions and minute areas of necrosis in the deeper tissues."

* The preauricular gland in Barck's case showed fluctuation. An opening into it brought forth only a small amount of pus, which was surrounded by broken-down tissue.

The tarsus was found to be normal by Bernheimer, after its removal from a cured case of his.

Gifford believes "that the infection starts with a greater or less number of small abscesses in or below the conjunctiva. In this stage the patient is seldom, or perhaps never yet has been, seen. When the abscesses break the discharge becomes profuse for a short time, and in most cases large granulations develop from the edges of some of the ulcerations or the small fistules left by the abscesses."

While histologically this form of conjunctivitis resembles tuberculosis in many points, yet it is not tuberculous in origin. The tubercle bacilli cannot be found, and inoculation experiments result in failure.

Bacteriology. - To date the examination of tissue and discharge for a specific bacterium as a probable cause has been fruitless, and, as Alt remarks after the examination of a case of Barck, "I was absolutely unable to stain any particular organism. If there is one, it is too small to be seen by our present means." Often the staphylococcus and B. xerosis are found. The streptococcus has been seen by Rohmer and by Villeneuve.

Gifford reports that in three of his cases nothing was found but what was of secondary importance.

Stirling and McCrea report a bacillus resembling the Klebs-Löffler organism. This was found for twenty-five days, while the patient was under active treatment. The impression received by these investigators was that they were dealing with a less toxic form of the diphtheria bacillus or with a virulent form of the xerosis bacillus which it seemed to have correspondence with, although the xerosis bacillus is recognized as innocuous in the eye.

Kornel-Scholtz, in a case resembling this disease, isolated what he believes to be the specific organism. Cultures made from nodules showed a small bacillus four times from five cultures. It was from 0·5 to 1·5 *microns* long, and arranged in chains of fives and sixes. It was negative to Gram. He also found it in smears from the lymph glands, although he could not cultivate it on the various media. It was pathogenic for mice and chickens. The corneæ of guinea pigs, inoculated with the germ, showed a diffuse opacity, which cleared in a few days. According to Axenfeld, the bacillus was very like the B. Gallinorum, and belonged to the group of the polar-staining bacteria, like those of plague and hæmorrhagic septicæmia.

Auerbach found pneumococcus from the pus from a large preauricular gland. He considered infection from animals doubtful. He regarded the necrotic areas of Verhoeff and Derby and the plasma cells of Matys as of no special significance.

Claiborne in the report of a case, could find only staphylococcus pyogenes aureus.

Inoculation experiments were made on rabbits by Gourfein and Sinclair and Shennen with negative results. The staphylococcus was the only organism recognized. Sinclair and Shennen, in reporting another case in Vol. XXVIII of the same *Transactions*, found two varieties of the white staphylococcus from the necrotic areas of the conjunctiva, while from the glands of the neck were isolated staphylococcus albus and aureus, and from a sinus streptococci.

Barck reports a case seen December 21st, 1908, which he submitted to microscopic examination as to the excised follicles and smears. The results were negative in all respects as to the presence of any specific bacterium.

From the evidence at our command, we are forced to the conclusion that if the disease is due to a bacterium, our present means of diagnosis are at least inadequate. That it is due to an infection there can be no doubt. That it is contagious is very doubtful.

Symptomatology. — In ordinary forms the patient's appearance is quite characteristic. The eyelids are markedly swollen, and at first sight the appearance is not unlike that present in gonorrhœal ophthalmia. However, the pus characteristic of that disease is wanting, and smears do not show the gonococcus of Neisser. The swelling takes place suddenly, and the discharge from between the eyelids is at first profuse but rapidly becomes scanty. Eversion of the eyelid shows the conjunctiva thereof to be the seat of very large granulations. These may be polypoid in character and pedunculated. There may be superficial, grayish ulcers present between the granulations. This condition of affairs may extend to the ocular conjunctiva as well.

The cornea is usually unaffected, although in the case to be immediately reported by the writer, such a lesion took place and healed, so that its site showed very little of the former trouble. The trouble looked like the shedding of the epithelium over about one-sixth of the lower portion of the cornea, and did not stain with fluorescein solution. It presented none of the appearances seen in the ordinary corneal ulcer. Similar appearances have been reported by at least two other observers, as quoted above.

The disease manifests itself by marked swelling of the glands of the face and neck of that side. In my own case that swelling was very marked in the preauricular gland, as well as in the parotid, submaxillary, and superficial glands of the neck. The glands seemingly would go on to suppuration, but that condition of affairs is very rare indeed, judging from the published cases. The glands are liable to be very tender on pressure. The adenopathy may precede the conjunctival lesion, as in a case reported by Gourfein.

The ocular conjunctiva frequently shows chemosis, as in the writer's case.

While it is the rule for the disease to be unilateral, yet Chaillous and Tufesco reported a case where both eyes were affected. Parinaud saw the patient, and concurred in the diagnosis of the disease

The temperature is usually above normal, never exceeding 101°F., and then only for a day or two. It gradually declines, and in a week or so becomes normal.

As to the symptomatology, Gifford suggests two classes may be differentiated, one with granulations resembling those of trachoma, and the more numerous cases in which polypoid character of the granulations is present.

Diagnosis. — The disease is to be differentiated from trachoma and tuberculosis. From trachoma that may easily be done, because this disease is unilateral, while in trachoma both eyes are usually affected. Moreover, in trachoma, involvement of the lymphatics does not take place. The cornea is very seldom involved in this disease, whereas in trachoma the reverse is the case. Then, too, Parinaud's disease yields readily to treatment for so severe a disease, while trachoma is liable to be very rebellious to treatment. Pannus is frequently seen in trachoma, but never in Parinaud's disease.

From tuberculosis: Axenfeld, in his work *Bacteriology of the Eye*, well sums up the situation in the following words: "In spite of the many points of histological resemblance, it cannot be said that tuberculosis is a likely cause of Parinaud's conjunctivitis. Every inoculation has failed, and search for the bacillus tuberculosis has also been unsuccessful."

From syphilis: there is no subsequent skin eruption, neither suppuration of enlarged glands nor induration of the eyelids, and the absence of these signs serves to differentiate this disease from syphilis.

From lymphoma of the conjunctiva of adults, Parinaud's disease differs both clinically and histologically.

Prognosis.—The disease is self-limited and tends to get well of itself in

from two to six months. So far, no cases have been reported in which material damage to eyesight resulted. In the writer's case, the duration of the disease was three and one-half months, and although the cornea was affected, the area of affection was below the pupil and no damage to vision resulted. So far, from the cases reported, we seem to be justified in telling patients that their prospect for perfect recovery is good. All reports concur that the eyelids are restored to a normal condition. The adenopathy disappears and leave no trace of its former existence. To date, no recurrences have been reported. It is to be confidently hoped that one attack will immunize against like trouble in the future.

Treatment.—Parinaud recommends the use of nitrate of silver in solution. In Gifford's cases sulphate of copper and a 2 per cent. solution of nitrate of silver were used. His opinion is that where the granulations are few, it is advisable to clip them off and to cauterize any ulcerations that may exist. Goldzieher believes in cutting off the granulations, checking the hæmorrhage with the galvano-cautery, using a 1 per cent (?) solution of bichloride of mercury, and in giving internally of iron and arsenic. Griffin removed the granulations by scissors, and applied at the same time a twenty-five per cent. solution of nitrate of silver. Bernheimer, in his case, after a prolonged treatment, and fearing permanent damage to his patient's cornea, excised completely the affected conjunctiva and the underlying tarsus, which, as noted above, he found to be normal. After five months, his patient left the hospital cured, but with the cornea affected. Gourfein treated his case with applications of a two per cent. solution of nitrate of silver to the everted eyelids, also hot applications to the eyelids and likewise to the swollen glands. Internally, he gave cod-liver oil. Cure was effected in a little over two weeks. Jocqs secured results with the galvano-cautery. Shoemaker found a one per cent. solution of nitrate of silver sufficient for his case. Dehenne and Bailliart secured rapid recovery in their cases by "thorough washing out of the diseased conjunctiva with a solution of the cyanide of mercury, 1 to 1,000; massage with a one per cent. yellow ointment daily; and lightly cauterizing the granulomata with a two per cent. solution of silver nitrate." Barck, in reporting his case, states: "all the excrescences were removed with scissors and a number of the yellow infiltrates were punctured and afterwards squeezed out with the trachoma forceps. There was hardly any reaction. The remainder of the yellow infiltrates were treated in the same manner one week later. The improvement was a very rapid one. After the surgical treatment, daily applications with a one per cent. solution of sulphate of copper were made. Internally, the patient was given arsenic and iron. In Webster's case, bandaging the eye favourably influenced the course of the disease.

These quotations are made to show that as yet there is no agreement as to what is best to be done in treating any individual case that may show itself to us in the future.

The treatment of the writer's case is given in the appended report:—

AUTHOR'S CASE.

Walter B., aged 18, of Otterbein, came to see me May 25th, 1908, because of a sore eye. He works on a farm, and hence helps to take care of the stock. The whole right side of his face was much swollen and tender, especially the glands of the neck. The eye was swollen-shut, the lids being thick and heavy. Both the palpebral and the ocular conjunctivæ were much swollen, the latter being in a state of chemosis. It looked like a case of gonorrhœal ophthalmia, although the lids did not have the board-like feeling as in the latter disease, neither was the characteristic purulent discharge present. There was but a slight discharge from between the lids. This condition was present now for one week. The cornea was clear and unaffected. The iris showed no inflammation, and the pupil readily responded to light and shade. The patient's temperature was but slightly elevated, and otherwise he seemed normal. The most peculiar thing about the case was

the appearance of the everted upper eyelid. It seemed to be swollen into one huge granulation; under the overhanging edges were some smaller ones. These were quite "soggy," but did not bleed readily on manipulation. All seemed to lack the pedunculated appearance described by other writers. The lower lid showed a similar condition. The other eye was normal and remained so.

A bacteriological examination, repeated several times, revealed no characteristic bacteria.

He was sent to the Hospital for treatment, which consisted of a daily application of a two per cent. solution of nitrate of silver to the everted conjunctiva, and in bathing the eye every hour during waking hours with a compress wrung out of water as hot as the back of the hand could stand. Every three hours a 10 per cent. solution of protargol was dropped in the eye. Every hour the eye was flushed with the following collyrium:

Zinc Phenolsulphonat	...	gr. j.
Acid Boric ..	... ..	gr. x.
Aquæ Dest.	.. ...	oz. j.

Between treatments and bathings the eye was kept bandaged.

Internally, he was given several purgings of calomel, and quinine and iron during his stay in the hospital.

After a few days the iris seemed to be sluggish and discoloured. A one per cent. solution of atropia sulphate was instilled every four hours until the symptom yielded. At the end of the second week of his stay in the Hospital, there appeared in the lower portion of the cornea an infiltration involving the substance thereof, but not the superficial layer. It refused to stain with fluorescein solution. The resulting opacity was negligible. His vision is normal. He was dismissed from the Hospital, June 28th, with the conjunctiva smooth and normal.

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56. **Von Boguaz.**—*Weiner klin. Wochenschr.*, 1907, S. 181.
57. **Webster.**—Parinaud's Conjunctivitis, *Med. Times*, June, 1909.
58. **Werner.**—Lymphoma of the Conjunctiva, *Opthal. Record*, 1904, p. 81.
59. **Wilder.**—Parinaud's Conjunctivitis, *Annals Ophthal.*, 1908, p. 397.
60. **Wolff.** *Arch. Ophthal.*, 1907, p. 71.
61. **Wolfflin and Ruprecht.**—Histology of Parinaud's Conjunctivitis, *Klin. Monatsbl. f. Augenheilk.*, März, 1909, S. 247.
62. **Wylie.**—*Ophthalmic Record*, June, 1901.

THE RESPONSIBILITY OF OPTICIANS.

MARKHAM *v.* WOOD-ABRAHAMS.

(Before Mr. Justice Ridley and a Special Jury).

Miss Marjorie Helen Markham, aged twenty-three, claimed against Mr. R. Thomas, qualified optician, who carries on business as Wood-Abrahams, at Market Street, Manchester, for alleged negligence in supplying spectacles and in examining and testing her eyes. The defendant denied any negligence. Sir F. Low, K.C., and Mr. F. A. Greer (instructed by Messrs. Lovell, Son, and Pitfield) appeared for the plaintiff, and Mr. McCall, K.C., Mr. A. Profumo, and Mr. H. Leach (instructed by J. Lee Smith, agent for F. W. Lyles & Co., Manchester) represented the defendant.

Mr. Greer said that the plaintiff was a student at the University of Wales studying science for the London degree. She had passed most of her examinations, and was working for the final test. Her father was a Wesleyan minister. The plaintiff consulted the defendant's firm about her eyesight in 1907, 1908, and 1909. Her eyes were examined and tested, and she was supplied with two sets of spectacles. From time to time she was given advice. She complained that it was not discovered that she was suffering from conical cornea, and that it was fatal for her to continue reading or close work. In

consequence of her not receiving proper advice her eyes had got into such a condition that she was now on the point of practical blindness. She consulted an oculist, who informed her that she was suffering from conical cornea, which, in his view, must have been in existence when she paid the first visit to defendant's firm.

The plaintiff gave evidence in support of her case, and the hearing was adjourned.

* * * * *

This was a claim by Miss M. H. Markham, living at Sale, near Manchester, for damages for alleged negligence by the defendant, Mr. R. Thomas, carrying on business in Manchester as Wood-Abrahams, in supplying her with spectacles and advice regarding her eyesight, in consequence of which, as she alleged, she had become almost blind and unable to continue a University course. The defendant denied any negligence, and said he was an optician and not an oculist, and had acted properly as such.

Sir Frederick Low, K.C., and Mr. F. A. Greer appeared for the plaintiff; Mr. McCall, K.C., Mr. Profumo, and Mr. A. H. Leach for the defendant.

It appeared from the opening of counsel that the plaintiff suffered from conical cornea, and she claimed that if she had received proper advice from the defendant she would have consulted an oculist and received suitable treatment. She first went to the defendant in September, 1907, after finding that reading gave her headaches. Mr. Thomas described himself as "qualified optician; London spectacle specialist." The plaintiff's father went with her and first saw Mr. Thomas's assistant, Mr. Ensor, and told him she wanted her eyes tested. He tested her sight and used an instrument called an ophthalmoscope, and asked her a number of questions about her occupation and work. He said her bad sight was due to astigmatism, and that with the glasses he would give her she would have good sight, and might in time be able to dispense with glasses. He sent glasses a few days later, and afterwards made some changes in them. In Easter, 1908, she again went to the premises and saw Mr. Thomas—at any rate, it was not Mr. Ensor—and said that print seemed to her blurred. He tested her eyes again and used the ophthalmoscope as if he was not merely a seller of spectacles. The glasses were altered without advantage. In June, 1908, her sight was worse, and she became anxious as to her prospects as a teacher of science and consulted him again and recounted her symptoms, and he again used the ophthalmoscope. She asked him if there was anything seriously wrong. He replied, "No," and on being asked if her bad sight was due to reading, said reading was not good for anybody. The glasses were again altered. On Easter Saturday, 1909, she again went and complained of difficulty in reading, and asked if he advised reading glasses, and he supplied her with them for 15s. 6d. However, her sight became worse and worse and she had frequent headaches, and she failed in her final examinations.

She finally, in November, 1909, consulted an oculist, Mr. Wray, who said the conical cornea must have existed in 1907, when she first consulted the defendant, and that any one with knowledge of eyes would have detected this condition and forbidden reading, and that her sight would probably in that way have been preserved, or, in any case, prolonged, but that in 1909 it was too late and she was on the verge of blindness.

The plaintiff claimed that the glasses supplied were insufficient and that her eyesight had been ruined by the defendant's negligence, while with proper advice she would have discontinued reading and have retained fair sight for a very considerable period.

The plaintiff then gave evidence in support of counsel's opening. She was

23 and the daughter of a Wesleyan minister. She went in 1905 to study science at Aberystwith University, and in 1906 passed the intermediate examination of London University. She had been working for the final examination before September, 1907, but found raeding was difficult and gave her headaches. Because of a Mrs. Thompson's advice she went to the defendant's and was told she had astigmatism and that glasses would relieve the headaches and difficulty in reading. Since seeing Mr. Wray she had done some light work in the way of coaching, but had done nothing else. She now found it almost impossible to see on looking downwards and she did no reading, nor could she play cards for any time without getting headaches.

In cross-examination she said she only paid the defendant 25s. and 15s. 6d. for the spectacles. She knew there were oculists and opticians, and also eye-testing opticians, who tested eyes for spectacles. Dr. Wray did not help in the letter her grandfather got her to write to the defendant, but her grandfather had previously seen him. She was now wearing Dr. Wray's spectacles; she did not think they were almost the same as those the defendant supplied. She worked for the science examinations three or four years before going to the defendant. In 1907 she first was troubled by her sight. She could not be certain what apparatus Mr. Ensor used in examining her eyes, but she thought he used an instrument like the ophthalmoscope counsel handed her. He gave her various glasses and asked her if they improved her powers of sight, and when she told him particular ones helped her he acted on what she told him and selected those glasses. He told her she was astigmatous. Before that she did not know it. She used the glasses for a month, and they helped her sight and headaches. In 1907 and 1908 she used the defendant's glasses continuously. She thought the defendant used the greatest care when she went to him. In June, 1908, she thought Mr. Thomas used an instrument to examine her eyes. In April, 1909, she told him her sight was worse than before, and asked if he could improve the glasses. He said her sight was as good as it could be for ordinary sight, and that he could not advise any change in the spectacles. He did supply her with reading glasses for 15s. 6d. In November, 1909, she got the spectacles Dr. Wray recommended. She now knew she was suffering from a physical defect of the eye. Three oculists for the defendant had examined her.

Re-examined.—She took her glases four times to the defendant's shop and left them there for alteration, but noticed no change in them. Her sight was very much better after getting Dr. Wray's glasses, especially for distance.

Mr. Charles Wray, senior surgeon to the Western Ophthalmic Hospital, &c., said the plaintiff, in November, 1909, was suffering from conical cornea. The early stages of that condition were extremely slow, but afterwards its progress became very rapid. In November, 1909, the second stage had supervened and reading would greatly injure her sight. She had, in 1909, been suffering from conical cornea for about eight years. In September, 1907, the ophthalmoscope, if properly used, must have detected it. Eyesight could not be properly tested without using that instrument. The defendant's two pair of spectacles were too weak for the plaintiff, and less than half the proper strength. If her condition had been detected in 1907 she should have been told to change her occupation and leave off reading entirely. Continuous study from 1907 to 1909 would make her sight very much worse, and it had hastened the practically certain loss of the sight of one eye and very possibly both. Had she had suitable glasses and advice in 1907 she would have saved the sight of one eye and perhaps both. The end of resources in the way of glasses had been reached, and only an operation might modify her condition. The reading

glasses supplied in April, 1909, seemed not to agree with the details in the defendant's book. The glasses were very badly wrong and quite useless for the plaintiff. Those he prescribed were more than double the strength

In cross-examination he said he had not taken a strong view against opticians prescribing spectacles at all without an oculist's prescription. It was not safe for them to do so unless they could prove the eyes were healthy or diseased. He thought an optician should not supply glasses without an expert's advice and had frequently expressed that opinion. It was not possible to say if conical cornea were congenital. In 1907 the condition was, he thought, in its early stages, and the entry in the defendant's book erroneous, because it omitted any mention of conicity. Only an instrument could have detected its presence. An optician should use any instrument required before prescribing glasses, and should be quite a qualified oculist. It was not hard to detect conical cornea in its early stages. It could not be cured, but in some cases it was possible to prevent it becoming hopeless. It was a progressive disease, and its progress could generally only be retarded. Miss Markham was likely to become blind, and was now incapable of earning her living. With his glasses her vision was one-half the normal, and about the same with the defendant's pairs.

Re-examined.—But his glasses reduced the strain on the eyes and retarded the disease. In such a case it was equally important to avoid any strain on the eyes or body. In November, 1909, her astigmatism was + 9, as against the defendant's + 3 in April, 1909. The defendant's glasses supplied in 1907 and 1909, were almost alike and made no allowance for increase in astigmatism. They were quite unsuitable.

Mr. N. B. Harman, ophthalmic surgeon, etc., gave further evidence of examination of the plaintiff's sight in January, 1910, corroborating the last witness.

The Rev. Arthur Markham, the plaintiff's father, said he could not say if any instrument were used at the defendant's for testing her eyes. He had used glasses for 20 years and had never consulted an oculist. She first complained of her eyes in September, 1907.

For the defendant, Mr. L. Ensor, one of the defendant's assistants, who had been supplying spectacles since 1902, said in 1907 he used the subjective test for the plaintiff by the use of different sizes of letters and taking her answers as to her sight and supplied her with spectacles accordingly. He used no ophthalmoscope, but he may have used a retinoscope or plain mirror. The spectacles were not altered subsequently. He told her the defect in her sight was due to astigmatism. He saw no signs of disease, and it was not his practice to look out for the presence of conical cornea, but he would have detected its presence by the failure of the subjective test, and if so, he would not have fitted glasses. He never used an ophthalmoscope. Conical cornea, in its advanced stages, could be detected without an ophthalmoscope by the naked eye.

Cross-examined.—He would have advised recourse to an oculist if he had detected conical cornea, because of the responsibility. His employer's eyesight testing room was adapted for the detection of conical cornea. There was in it a plain round mirror, which might be called a rough form of ophthalmoscope, and there were also ophthalmoscopes there, but not for use. No one to his knowledge used them for testing. Conical cornea might be detected by the mirror. The entries in the defendant's books showed the same astigmatism in the plaintiff in 1909 as in 1907. He could not account for the great difference between that amount and that discovered by the plaintiff's oculists in November, 1909, and January, 1910.

Re-examined.—He was certain his tests in 1907 showed the real state of the plaintiff's eyes. If conical cornea had then been in an incipient form he could not have detected it; but the subjective test would have shown its presence, because it would have prevented her from seeing some of the letters, but that was only when it was fairly advanced.

Mr. Thomas (the defendant), an optician, of Market Street, Manchester, said he took over the business in 1905 as his own. He had been in the optical business for 22 years. The tests of the plaintiff's eyes were those usual at an opticians. It was not usual in his business to use an ophthalmoscope or a mirror, but the latter was sometimes used. He first tested the plaintiff's eyes in April, 1909, with the letters and for astigmatism. He found there had not been much change in her sight between September, 1907, and April, 1909 She told him she had been studying night and day and he said she should not do too much reading but rest her eyes and then go on reading again. The reading glasses he gave her were one diopter different from those of 1907. He did not detect conical cornea, and had never had a case of it. He had passed in 1897 the examination in optical materials, and in 1898 that for subjective tests of the British Optical Association, and in 1900 he got the diploma of the Spectacle Makers' Company. Those examinations did not deal with diseases of the eye. He had no medical degree or diploma and had never said he had any medical skill. Dr. Wray's glasses allowed for four extra degrees of astigmatism.

Cross-examined.—He did not know how to use the ophthalmoscope, but they used it on one another in the shop. In the case of any disease a patient was sent to the oculist. In April, 1909, conical cornea may have existed, but to him it was not visible. It may have existed in September, 1907. He did not agree that it must have become visible in April, 1909. He did not use the mirror in her case, because he generally did not do so. He thought he would not have detected conical cornea if he had used it. The great development of the disease occurred, in his opinion, between April and November, 1909. In 1908 he did not agree that she told him she had something serious the matter with her eyes. His assistants had not diplomas, but they were trained in the subjective method by him. By "qualified optician, London," he meant that the Optical Association in London had examined him. All opticians were not eyesight testers. He called himself "eyesight and spectacle specialist." He tested to discover defects in the vision.

Re-examined.—Ensor had been in the shop since 1901, and had been through a lecture course in optics. Miss Markham asked for spectacles and was supplied with proper ones. He judged of her sight through her ability to read certain figures, and accordingly concluded she had no disease. He did not hold himself out as possessed of special qualifications.

* * * * *

The hearing of this action for damages for the alleged negligence of Mr. R. Thomas, trading as Wood-Abrahams, at Manchester, opticians, whereby the plaintiff said that her eyesight had been very seriously impaired, was resumed. A report of the previous proceedings appears in *The Times* of October 25th and 26th. Sir Frederick Low, K.C., and Mr. F. A. Greer represented the plaintiff; and Mr. McCall, K.C., Mr. Profumo, and Mr. A. H. Leach the defendant.

Further evidence for the defence was given by Mr. G. Hartridge. He examined the plaintiff with Mr. Wray in September last. She had conical cornea in a medium stage. Dr. Wray's spectacles were the best for her, and with them her vision was rather good considering her disease. He thought the disease was in an incipient stage three years ago. He could not say if

the glasses supplied in 1907 were suitable or not. They were for an astigmatic condition. He did not think they would hurt her sight. Conical cornea was very hard to detect in its early stages. He did not think it an optician's duty to detect diseases of the eye. Conical cornea was liable to progress whatever glasses were used. It was difficult to arrest.

Cross-examined, he thought she had a very fair chance of retaining her sight. He agreed that study would be very unwise. He did not dispute Dr. Wray's opinion that the disease may have begun eight years ago. After five years' progress he would expect it to be fairly developed, but not so that an optician with his methods would detect it.

Re-examined.—If astigmatism varied greatly at different periods, that might indicate some disease. If complaint of trouble with her eyes was only made in 1907 he would expect the disease then to be in its early stages and difficult to detect. In September last she was not very nearly blind, and he did not think it could be said she was almost certain to become blind.

Mr. Sydney Stephenson, who examined the plaintiff in February last, corroborated the previous witness, as did Mr. Ettles, who examined her in September last.

His Lordship, in summing up, pointed out that the defendant was not a professional man, and therefore no standard of skill was applicable to him. People ordered glasses as they did telescopes, at their risk. An optician, however, was bound to exercise reasonable care. If he found some disease he should refer the sufferer to an oculist. His Lordship referred to the conflicting expert medical evidence and asked when the disease ought to have been detected. He did not agree with the suggestion that every optician ought to be an oculist. The question was whether the defendant or his assistant should have had their suspicions aroused as to the existence of disease.

The jury, after a long absence, said they could not agree, and were discharged.—*Times Law Reports*, October 25th, 26th, and 27th, 1910.

CURRENT LITERATURE.

NOTE.—Communications of which the titles only are given either contain nothing new or else do not lend themselves to abstract.

I.—TERATOMA OF THE ORBIT.

Coulter, R. J. and Coats, G.—Teratoma of the orbit. *Royal London Ophthalmic Hospital Reports*, January, 1910.

The patient suffering from this rare condition was an infant, whom **Coulter**, of Newport, saw on March 2nd, 1909, the child at that time being three days old. The birth was normal, and no instruments were used. The left eye was much proptosed and lay outside the orbit, the cornea was opaque, and a soft tumour could be felt in the orbit. Five days later the proptosis was more marked, and the cornea and conjunctiva were ulcerated. The tumour was tapped and 3 drachms of blood-stained fluid were removed. The lids could now be closed and were sutured together. The sutures soon cut out and the cornea sloughed, and the child

died on March 17th, being then three weeks old. The tumour filled the left orbit. It was lobulated and surrounded the optic nerve. A *plaque* of hyaline cartilage was visible and there were numerous cysts. "The tumour consists of a jumble of tissues derived from all these embryonic layers." They contain connective tissues of various types, skin, brain substance, intestine, an internal gland, probably liver, respiratory mucous membrane, and cysts with linings other than intestinal or respiratory mucous membrane. The microscopic appearance of all these tissues is carefully described and illustrated with photomicrographs.

No case has been described in English literature for twenty-five years, and an admirable summary of previously reported cases is given, while the origin of these curious growths is discussed. C. DEVEREUX MARSHALL.

II.—THE "PARADOXICAL DIPLOPIA" OF SQUINTERS.

Adam, C.—Studies with reference to absolute localisation and the so-called "paradoxical diplopia" in squinters. (Studien über absolute Lokalisation und sogennante "paradoxe Doppelbilder" bei Schielenden.) *Zeitschrift für Augenheilkunde*, Dezember, 1909.

Adam, of Berlin, comes to the following conclusions after a study of several cases of patients, mostly neurasthenic women, who were troubled by diplopia after squint operations, a diplopia caused by an abnormally heightened sensibility of eccentric portions of the retina, the so-called "false maculæ:"

(1) It is essential when dealing with squinters sharply to distinguish motor from sensory defects, for the latter may, after operative cure of the former, by disturbing anatomical relationships, give rise to great discomfort in the form of diplopia which may persist for years.

The author relates one case in a melancoholic neurasthenic woman in which eight squint operations were performed, and each produced a different form of diplopia, although they rectified the squint. Finally, v. Michel attempted to reproduce the original squint, but the operation was unsuccessful. The end of the case was tragic.—She went to another ophthalmic surgeon *who enucleated her left, perfectly normal, eye*, and so rid her in a drastic manner of her diplopia.

(2) These sensory defects, which should logically correspond with a motor defect but do not necessarily do so, may remain unchanged in all their details for years.

(3) Absolute localisation is not in squinters entirely dependent upon the normal muscle sense, but upon an abnormal muscle sense which is elicited in squinters by the abnormal relations between the ocular muscles. These abnormal sensations may remain unaltered after operative rectification of the strabismus, and may determine an absolute false localisation. This "absolute false" localisation is, like the false relative localisation, dependent upon a series of external factors and varies within wide limits from time to time. In this way it differs from normal absolute localisation.

T. HARRISON BUTLER.

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III.—TUMOURS OF THE ORBIT.

(1) **Fehr.**—A case of cavernous lymph-angioma of the orbit. (Ueber einen Fall von Lymphangioma cavernosum orbitæ.) *Centralbl. f. prak. Augenheilk.*, Mai, 1908.

(2) **Watanabe, B.**—A case of intervascular endothelioma of the orbit. *Archives of Ophthalmology*, March, 1909.

(3) **Shumway, Edward A.**—Metastatic carcinoma of the orbit, with the report of a case. *Trans. American Ophthalmological Society*, Vol. XII, Part I, 1909, and *Archives of Ophthalmology*, September, 1909.

(4) **Haden.**—Melanotic sarcoma of the orbit. *Ophthalmic Record* January, 1910.

(5) **Guglianetti, Luigi.**—Fibroma of the orbit in a carp. (Fibroma dell' orbita in un ciprino.) *Archivio di Ottalmologia*, January, 1910, p. 289.

(1) To the few reported cases of this disease **Fehr** (Berlin) adds another which occurred in a woman, *æt.* 45 years, who for 1½ years had suffered from a gradually increasing right exophthalmos. The eye was driven directly forward to the extent of 12 mm., and there was no interference with movement—V.= 1/15 + 5 = 5/15, showing considerable axial hypermetropia. The tumour, which was inside the muscle-cone, was removed by the Krönlein method, and proved to be a cavernous lymphangioma. The result, after a transitory abducens paralysis had passed off, was perfect, and vision became normal again, without there being any hypermetropia. A list of the previously reported cases is appended. A. LEVY.

(2) **Watanabe** describes a case of endothelioma of the orbit, in a child of six months, which was removed as thoroughly as possible twice, at an interval of about a year. The second time Krönlein's operation was adopted, to obtain freer access. A second recurrence has not yet—a year and a half later—taken place. Microscopically, the first tumour showed a typical angioma, although the vessels were not separated by connective tissue, but by cells, of an endothelial type, closely packed together. The second tumour was the same as the first except that there was great proliferation of the endothelial cells, which in many parts alone formed the tumour. The infiltrating processes marked the tumour positively as malignant. The only sure way of diagnosing this kind of tumour from an angioma is by microscopical examination. Operation in these cases should never be delayed, and it is best to explore deeply by means of Krönlein's operation. ROSA FORD.

(3) In this case by **Shumway**, of Philadelphia, a carcinomatous growth at the back of the eyeball caused marked proptosis. Three months previously the refraction of the eye had been tested, and the fundus shewed no abnormalities: V.= $\frac{20}{20}$. The patient was the subject of multiple carcinomatous lesions, and the orbital metastasis was evidently in the external muscles and other orbital tissue, and not in the choroid, its more usual situation.
ROSA FORD.

(4) The patient seen by **Haden**, of Galveston, Texas, was a child, five years of age, of good personal and family histories. The left eye had been noticed to be lower than the right two weeks before the examination was made. When seen: vision $\frac{6}{6}$ in each eye, fundi normal, left eye 15 mm. below level of right. Diagnosis: tumour of orbit.

Three days later, orbital tumour removed by orbitotomy along lower border of supra-orbital margin. Consent to removal of eyeball refused. The growth recurred in three weeks, and complete exenteration was performed. This was followed by application of X-rays daily for eight days, but granulations promptly formed and tumour rapidly returned. It was removed with ecraseur and curette three times within eight weeks after operation. Death occurred about fourteen weeks after first operation. J. JAMESON EVANS.

(5) **Guglianetti** refers briefly to the occurrence of tumours in cold-blooded animals, and then records the case in which he found a large fibroma growing from the orbit of a carp and dislocating the eye downwards and forwards.

The orbital cavity was greatly distended and the eye was disorganised.

LESLIE BUCHANAN.

IV.—WILBRAND'S PRISM TEST.

Köllner, H.—On Wilbrand's prism experiment in hemianopia. (Ueber den Wilbrand'schen Prismenversuch bei der Hemianopie.) *Zeitschrift für Augenheilkunde*, Juli, 1910.

Köllner, H. (Berlin).—Wilbrand's prism test for localising the seat of a lesion causing hemianopia is carried out in the following manner.—The patient is seated at 30 cm. from a black surface and fixes with both eyes a white piece of paper about 10 mm. in diameter affixed to this surface. Two strong prisms are now placed in front of each eye, so as to throw the image of the white paper suddenly upon the hemianopic areas of the retinæ. The patient is watched to see whether he moves his eyes at once to recover the vision of the object, and whether he does the same when the prisms are suddenly removed.

A rapid adjustment of the eyes to the new position points to the lesion being supra-nuclear. If the object is not immediately re-found, the lesion is probably infra-nuclear—in the chiasma, for example. Wilbrand himself felt that the experiment did not always yield accurate results, and stated that further experience was necessary before it could be held to be trustworthy. Behr holds that the method is a valuable aid to diagnosis, but Bielschowski, Schwarz, and Knisius are not satisfied as to its value. The *crux* of the matter is, can the object act upon the hemianopic retina in such a way that a reflex is set up which automatically returns the lost image to the macula? Köllner, as the result of several experiments, appears to agree with Bielschowski that such a reflex is not present, but that the lost object is at first consciously and then almost subconsciously sought for and found. When the hemianopia spares the macula, weak prisms cannot be used, and strong ones introduce difficulties in fusion. With a weak prism we cannot with certainty throw the image outside the seeing area, which often extends 5° from the fovea.

Our neurological colleagues have much more opportunity of determining the true value of this test than have ophthalmologists.

T. HARRISON BUTLER.

V.—THE LYMPHATIC CHANNELS OF THE EYE AND THEIR RELATIONSHIP TO DISEASE.

Samperi, G.—Eye diseases studied in regard to the lymphatic channels and general constitution. (Della appezioni oculari in rapporto alle vie Linfaticle ed alla costituzione generale,) *Archivio di Ottalmologia*, October, 1909. Page 174 and continued.

This long paper is the outcome of a special study of the subject made by **Samperi** in Raymond's *clinique* at Turin, and is the second portion of the subject only.

It is presumed that the first portion dealt with the lymphatic channels in connection with the eyelids, conjunctiva, etc., for this, which is called the second part, deals with the uveal tract and optic nerve.

The paper is of considerable length, being continued through eight numbers of the journal, and deals with three conditions in special—namely, glaucoma, sympathetic ophthalmia, and optic neuritis.

Samperi begins with an historical *résumé* of the literature regarding the lymphatic spaces and channels in connection with the eyes from the works of Schwalbe and this onwards down to the recent studies of Nuel and Benoit. He then gives the results of 14 experiments conducted by himself. Roughly stated, the views expressed are those commonly accepted—namely, that there is a lymph current from the ciliary body to the posterior pole of the lens, and thence round the equator of the lens to the pupil and into the anterior chamber. Absorption from the anterior chamber is by the filtration-angle primarily, and by the iris and ciliary body secondarily. The existence of a well-defined current backwards to the optic nerve entrance through the vitreous body is uncertain.

The author then takes up glaucoma, and the principal symptom of that condition, increase of intra-ocular tension. He states that the first mention of actual increase of the tension was by Demour and Weller, and whilst later writers have laid special weight upon the symptoms, as, for instance, Mackenzie did, it is not until we come to von Graefe that any real advance was made in the study of the subject.

The various theories advanced to account for the facts in the clinical history of glaucoma are passed in review, from von Graefe onwards. Whilst this is interesting to the literary antiquarian, it is open to doubt if it is of much practical value, and we prefer, here, at all events, to state briefly that the literature is well done, and that, for any one who wishes to study the subject, it is well worthy of perusal. It is of Samperi's work and thoughts in particular that we must speak. Samperi, then, concludes the part dealing with this subject by general statements to the effect that anything which interferes with the lymphatic circulation in the eye may be a cause of glaucoma, and the most frequent position of obstruction is at the iridal angle, and, finally, that this obstruction is determined principally by sclerosis of the vessels in the neighbourhood of the venous plexus of Schlemm.

Having thus finished with glaucoma, Samperi passes on to sympathetic ophthalmia, beginning with research as to the presence of lymphatic connections between the interior of the eye and the optic sheaths, and between the sheaths of the two sides. He gives briefly the result of the work of each writer on the subject.

It is concluded that there is lymph communication between the supra-choroidal space and the space of Tenon, and that from thence lymph passes into the intervaginal space surrounding the optic nerve. Injection experiments have

shown that fluid can pass from the intravaginal space to the subarachnoid space, and Knies has been successful in getting fluid to pass from the optic nerve sheath on one side to that on the other. It is probable that there is no communication from the interior of the eye direct into the intravaginal space at the optic nerve entrance, the latter entrance being a *cul-de-sac*.

Taking up sympathetic ophthalmia from the end of the sixteenth century (Bartisch) onwards, Samperi exposes the various views which writers on the subject have put forward. The three main groups are criticised: the ciliary nerve theory, the microbic theory of Berlin, and the migratory theory. It is held as demonstrated that sympathetic ophthalmia is produced by a micro-organism which passes from one eye to the other by the channels above indicated, and that this organism is specific. On the basis of bacterial research, it is held, further, that an organism of the class of bacillus subtilis (B. mycoides or B. megather.) which is saprophytic, is ordinarily present in the conjunctival sac, and which is spore forming, is the specific cause of the disease. Samperi has performed experiments on rabbits by putting chips of iron infected with B. subtilis into eyes and examining the eyes and their fellow eyes after a prolonged period.

We are bound to admit that the results do not strike us as specially favourable. In no case was B. subtilis found in the other eye, although in one case a pathological condition of the cornea and iris developed. Similar experiments, using other organisms—pneumo-bacillus, streptococcus, staphylococcus aureus—gave the same negative result. The B subtilis was found in the optic chiasma in several cases.

Coming now to the last part of the paper, we find that the author takes up papillitis optica by stasis. This is perhaps the most interesting, as it is the most important, chapter of the work.

The various theories as to the causation of optic neuritis as an accompaniment of cerebral or intracranial disease are passed in review and criticised. Cases are quoted of great interest, and experiments detailed. The author has performed experiments with the object of discovering if by simply raising the intracranial pressure it is possible to give rise to papillitis. Various substances (vaselin oil and saline solution) were injected into the cranial cavity, and it was found that, when a pressure equal to 90 mm. of mercury was reached, the retinal vessels became turgid it is true, but respiration ceased.

Cauterisation of the cerebral tissue was then tried with the object of finding if the presence of toxins in the cerebro-spinal fluid sufficed to bring about papillitis, and in one case, that of a dog which lived for several weeks, distinct inflammatory changes were found.

The writer quotes cases which show that there may be profound changes in the brain without any concomitant optic neuritis, and *per contra* that there may be intense optic neuritis, headache, and other localising evidences of cerebral disease often simulating tumour of the brain, and yet nothing definite is found. The occurrence of optic nerve and retinal changes in anæmia, diabetes, albuminuria, and other conditions is remarked upon as accentuating the difficulty of explaining how increase of tension alone can account for the ocular changes.

The conclusions drawn from the *data* given are somewhat as follows.—The inflammatory theory (Leber's modified) is that which most satisfactorily accounts for the changes found. Increase of tension is not necessary, nor is it proved that any poison is present in the cerebro-spinal fluid.

The cause of the irritation, whatever it may be, is probably circulating in blood stream, and sets up a more or less chronic or subacute inflammatory action of the optic nerve and its extension in the eye.

Embryologically, the nervous part of the eye is a continuation of the brain, and consequently the one organ will react to any source of irritation which may be influencing the other.

The eye is not to be regarded as a "manometer" of the brain registering the changes of pressure in the intracranial cavity.

The paper is one which, for many reasons, is exceedingly difficult to abstract. It is very long, and deals with a considerable diversity of subjects, but we think that the remarks made above indicate the lines of the paper, and the conclusions drawn from the large mass of evidence at the author's disposal. Practically, all the ground covered is "ground for contention," but the author avoids dogmatism in a very satisfactory manner. LESLIE BUCHANAN.

VI.—DISINFECTION OF THE SKIN BY IODINE.

Segelken, H.—The disinfection of the skin with tincture of iodine before operations on the eye. (Zur Desinfektion der Haut mit Jodtinktur vor Augenoperationen.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1910, and *American Journal of Ophthalmology* (translation by Adolf Alt), September, 1910.

In 1908, A. Grossich, of Fiume, published an account of his method of disinfecting the skin prior to operation by means of tincture of iodine (*Zentralbl. f. Chirurgie*, October, 1908). He simply brushed the unwashed skin with the iodine, and repeated the process when the operation was finished. Wounds treated in this way healed by first intention. The method was also applied by Grossich to accidental wounds, with a like happy result. As a further extension, the same author has now given up bandaging, and brushes the skin sutures daily with the tincture until the cicatrix is formed. Eczema may rarely follow the application of the iodine, especially when it is made to such parts as the scrotum, perineum, face, or neck. By Koenig it is supposed that the skin is hardened by the alcohol contained in the tincture, so that the bacteria are fixed, while their further development is hindered by the iodine of the preparation.

Segelken, of Stendal, Germany, has performed seventy-eight operations upon the eyes in which he disinfected the skin of the eyelids by means of common tincture of iodine. His list included cataract, enucleation, extirpation of the lacrymal sac, exenteration, iridectomy, tenotomy, symblepharon, plastic operation on the conjunctiva, and so forth. In addition to these, the tincture was applied in five cases of recent sclero-corneal wound, and in one case of discission to the point of puncture on the scleral conjunctiva. No disturbance took place during the healing of the wounds. No complications were observed, except a passing œdema or erythema of the skin of the eyelids in predisposed patients. He brushes the skin with iodine once only, and in his last ten cases has contented himself with diluted tincture of iodine (5 per cent.) Segelken concludes that "we have in the tincture of iodine an agent which in eye operations simplifies disinfection greatly and evidently perfects it."

SYDNEY STEPHENSON.

VII.—EHRLICH-HATA'S "606" IN EYE WORK.

(1) **Ehrlich's new antisyphilitic remedy.** *American Journal of Ophthalmology*, August, 1910.

(2) **v. Grosz, Emil.—Arsenobenzol (Ehrlich's 606) in syphilitic affections of the eye. (Arsenobenzol gegen syphilitische Augenleiden.)** *Deutsche med. Wochenschrift*, 15 September, 1910.

(3) **Fradkyng, S.—"606" and its value in eye work. (Le "606" et sa valeur en oculistique.)** *La Clinique Ophtalmologique*, 10 octobre, 1910.

(4) **Lindenmeyer.—Experiences with Ehrlich-Hata. (Ophthalmologische Erfahrungen mit Erhlich-Hata.)** *Münch. med. Wochenschrift*, Nr. 43, 1910, and *Woch. f. Ther. u. Hygiene des Auges*, 3 November, 1910.

For the last few months the medical press has rung with the merits of the new remedy for syphilis discovered by Professor Ehrlich, of Berlin. This arsenical preparation (of which the dose is from 0.3 to 0.6 grammes by injection) has been called "606," since its polysyllabic name, dioxydiamido-arseno-benzol, is too cumbersome for everyday use, and also because it was the 606th product experimented with by the indefatigable professor. It is stated to contain 41 per cent. of arsenic. It is a sulphur-coloured powder, the formula of which is C_{12}, H_{12}, O_2, N_2, AS_2. Its effects, as reported from Berlin, are simply wonderful in controlling and in curing the manifestations of syphilis, irrespective of stage. Especially striking is the action on so-called "malignant" syphilis. Cases intolerant to mercury yield readily to arseno-benzol. Indeed, it seems impossible to doubt that in this preparation we possess a potent remedy for the treatment of syphilis. The Wassermann reaction, positive prior to the injection of "606," is stated to become negative afterwards. A note of warning, however, has been sounded by Professor Bouchard, of Paris. That authority has declared that preparation "606" has already caused numerous deaths. Even in Berlin itself, according to the *Medical Press and Circular* (September 21st, 1910), "many unfortunate experiences have followed the administration of 606." It is advisable therefore to remember that there may be a reverse to the shield.

That "606" should be employed sooner or later in affections of the eye was inevitable In the last number of THE OPHTHALMOSCOPE was published an article from the pen of Dr. G. Lindsay Johnson, who has been investigating the action of the new preparation in Germany, and a letter from that gentleman will be found in the present issue.

We now give abstracts of some other communications dealing with the action of "606" upon the eye.

(1) The first article describes the meeting of the Berlin Medical Society on June 22nd, when a full-dress discussion was held dealing with the new remedy. It recounts the search by Ehrlich and Hata after some arsenical preparation which should exert no evil effects upon the optic nerve, and yet should be efficacious against the poison of syphilis. The product discovered by those observers was found by experiment on animals to cure spirillosis perfectly in doses which represented a hundreth part only of a toxic dose. The remedy was then handed over to Alt, director of the Insane Asylum at Uechtspringe, for experiment on man. The report was that in "606" we had a remedy of great value and one that was apparently free from noxious influence. By other speakers, as Wechselmann, Schreiber, and Michaelis, it was stated that even in inveterate cases of syphilis, the symptoms had disappeared in a few days after a single injection of 0.6 gramme. After the injection the Wassermann reaction became negative, and had not become positive again in any of the cases so treated.

(2) **von Grosz** holds that while arsenobenzol is strictly indicated in syphilitic affections of the eye, it should not be employed in cases of simple atrophy of the optic nerve, just as little as mercury, which in the latter cases has often been found to act detrimentally. He followed Wechselmann's directions in preparing the drug for injection. Fourteen cases were treated, namely, conjunctival chancre (1), iritis (3), kerato-iritis (1), scleritis (1), choroido-retinitis (2), and interstitial keratitis (6). In all these cases the new remedy proved extremely efficacious. Unpleasant effects were absent.

(3) A general review by **S. Fradkyng** of "606" with particular reference to its employment in eye work by Neisser (optic neuritis with muscular paralysis and interstitial keratitis), Wechselmann (optic neuritis, kerato-iritis, ptosis and paresis of external ocular muscles), Glück (interstitial keratitis, ritis, and optic atrophy), Dörr (diplopia), Hoffmann (exophthalmia and paresis of oblique muscles), Igersheimer (interstitial keratitis), Axenfeld (syphiloma iridis), and Michaelis (pre-ataxic symptoms).

(4) In five cases of parenchymatous keratitis, caused by hereditary syphilis, in which the Wassermann reaction was positive, **Lindenmeyer** had used an injection of "606." The carefully neutralised suspension was injected into the upper-outer quadrant of the gluteal muscle. Except for the first case, in which violent pains were experienced for about an hour after the operation,* no noteworthy troubles were observed. A slight increase of temperature was noted during the first two or three days. All the cases treated by the new remedy had already been submitted to an inunction cure, some of them on several occasions. In four of the cases there had been marked photophobia before the injection. For the most part the eyes were only half-opened, and were very sensitive to light during examination. The photophobia had nearly completely disappeared sometimes ten hours but certainly twenty-four hours after the injection. The eyes could then be well opened under focal illumination. No result as regards the corneal process itself has so far been observed, but, then, the period of observation has been too short to allow of a trustworthy opinion being formed on this point. SYDNEY STEPHENSON.

VIII.—HANDWRITING.

Beauvois.—Upright and oblique writing. (Ecriture droite et ecriture penchée.) *Recueil d'Ophtalmologie*, janvier, 1910.

Upright writing has long been advocated on the Continent, notably by George Sand (1872), Javal (1879), and Schubert (1880), and has received the support of ministerial and medical commissions appointed to investigate the causes of myopia among scholars in France. Orthopædic surgeons have also given the method their approval, and have condemned the slanting method of writing, owing to its tendency to produce scoliosis. Notwithstanding this wholesale condemnation of oblique writing and the formation of Societies to advocate upright writing, the latter has not found great favour with the public—at any rate in England—and even in France the slanting writing has been vigorously defended by M. Desnoyers and Drs. Péchin and Ducroquet†. **Beauvois's** chief object in this paper is to refute the statements of the latter that the dangers of the upright method are greater than those of the slanting, which is held by them to be less fatiguing, simpler, and more expeditious.

According to the method of oblique writing described by Péchin and Ducroquet, the weight of the body is supported by both elbows, which are

*Absence of pain is stated to depend upon the exact neutralisation of the product, which, by the way, has been patented.

† *Archives d'Ophtalmologie*, August, 1908. OPHTHALMOSCOPE, August, 1910.

supposed to rest on the table, and with the copy book inclined so that the left-hand top corner is lower than the right there is no tendency to rotation and curvature of the spine or approximation of the head to the book.

Beavois does not admit that the position described and illustrated by the authors is that adopted by the average child who writes obliquely, and if their method were to be adopted the child would have to approximate his chest so near the table that there would be danger of harmful compression of the thoracic viscera. Beavois finds that, as a rule, the child who writes slantingly pokes his elbow into his side, drops the right shoulder, bends the head to one side and bends and twists his spine. He insists that the upright method is less fatiguing, and though it is possible for a child to adopt a vicious position with his method of writing, it is exceptional and reprehensible. The argument that the upright writing is not suitable for rapidity is not borne out by the author's experience in Swiss schools ; nor can it be said that banks and commercial houses object to it when hand-writing is being so largely replaced by (upright) typewriting. All arguments in favour of oblique writing are outweighed by its greater tendency to produce scoliosis and myopia, and the author makes an appeal for its exclusive use in elementary and intermediate schools. J. Jameson Evans.

IX.—LOSS OF AN EYE FROM BLOWING THE NOSE.

Tacke.—Loss of an eye from blowing the nose roughly. (Perte d'un œil par un effort brusque fait pour se moucher.) *Ann. d'Oculistique*, mars, 1910.

Tacke, of Brussels, records the case of a healthy man, aged 22, who suddenly lost the sight of his right eye after prolonged and violent blowing of his nose. When first seen 24 hours after the loss of sight, he had no perception of light, and the fundus presented an appearance resembling that seen in embolism of the central artery of the retina, except that the arteries were only narrowed instead of filiform. There was also a small hæmorrhage on the disc. Two days later, the patient could count fingers at 22 c.m., but had a central scotoma and contraction of the upper part of the field to 25°. In six weeks, the œdema had cleared off, leaving a slight veil through which the choroid was seen, but the disc was paler than formerly. The scotoma had gone, but the vision was only $\frac{1}{10}$, and the contraction in the upper field still remained.

Tacke considers that the blindness cannot have been due to an embolism, because the ophthalmoscopic appearances were not typical and there was nothing in the general condition of the patient to account for such a lesion. He suggests that this was a case in which there was a sphenoidal sinus separated from the optic foramen by a thin wall only, which yielded to the pressure from the forcible blowing of the nose, causing a bruising of the optic nerve with hæmorrhage from some of the fine vessels in its interior, and complete blindness from compression, which cleared off when filtration of the blood in the fibrillar interstitial tissue took place, leaving a defect in the upper part of the field, owing to collection of the blood in the lower part of the nerve. The central vision did not return until later, because the central or macular fibres were the most affected, and the permanent diminution of vision was due to pathological changes.

The author endeavours to support his somewhat fanciful theory by references to the results obtained by Magnus, Surt, Marckwood, and others from experimental injuries to the optic nerve. R. J. Coulter.

X.—OSSEOUS METAPLASIA IN THE EYE.

Bornancini.—Some observations on the metaplastic development of bone and medulla in the eye. (Osservazioni sulla metaplasia osseons medollare nell'occhio.) *La Clinica Oculistica*, Nov.-Dec., 1909.

Bornancini's paper is based on the examination of five eyes, in four of which such great degeneration had taken place that they were reduced to mere stumps; the fifth, however, retained the size and appearance of a normal eye. Three of the four shrunken eyes were so much alike in their condition that Bornancini describes them together. The sclerotic appeared thicker than normal and was thrown into folds. The whole cavity of the bulb, with the exception of a small space behind the cornea, representing the anterior chamber, was filled with deeply pigmented tissue, here and there disposed in folds, suggesting the aspect of the ciliary body. A few millimetres in front of the equator there were two symmetrically-placed zones in the region of the normal choroid, which showed the features of bone. Some of the bony lamellæ contained spaces, which were filled by marrow, fat-globules, and by blood-vessels.

The lamellæ were placed in the middle of tissue consisting of a delicate framework of connective tissue fibres, which marked out spaces fairly regularly oval. All these seemed empty with the exception of a few which contained the elements of marrow. Bornancini supposes that all the spaces which appear empty have lost their similar content during preparation. In the middle of the medullary zone, it is possible to see here and there masses of homogenous substance which resembles bone. All through, the tissue is unusually rich in blood-vessels. The marrow has in some regions the aspect of red marrow; in the rest, that of marrow-fat.

The formation can be seen to start in the most internal layers of the choroid, the layer of large vessels escaping at first. In every case, however, the bony lamellæ are not in direct contact with the choroid or sclera, but are separated from this by a layer of marrow.

In the eye which was not reduced in volume, the development of medulla was "relatively last," and the bone was a thin shell. As to the mode in which the bone appears, Bornancini holds that it developed as "membrane bone," and the marrow appears as a secondary formation.

HAROLD GRIMSDALE.

XI.—PATHOLOGY.

(1) **Miyashita, S.—Contribution to the pathological anatomy of diplobacillary conjunctivitis. (Ein Beitrag zur pathologischen Anatomie der Diplobazillen-Konjunktivitis.)** *Klin. Monatsbl. f. Augenheilkunde*, Mai-Juni, 1910.

(2) **Botteri, A.—Contribution to the pathological anatomy of choroidal sarcoma (Beitrag zur pathologischen Anatomie des Choroidsalsarkoma.)** *Klin. Monatsbl. f. Augenheilkunde*, Mai-Juni, 1910.

(1) **Miyashita** had the opportunity of examining the histological changes in diplobacillary catarrh of the conjunctiva. The specimen was derived from a

man aged 60 years, who died of erysipelas, and who had been suffering for years from blepharo-conjunctivitis with mucous secretion, in which staphylococci and diplobacilli had been determined. The epithelium of the tarsus showed extensive formation of papillæ, that of the fornix shedding and transformation into goblet-cells. There was a high degree of sub-epithelial infiltration, of which plasma-cells formed the chief constituents. In the lower lid were several cysts made up mainly of epithelioid and giant cells; the latter contained cholesterin. No micro-organisms of any kind were found in the sections. C. MARKUS.

(2) **Botteri's** case of choroidal sarcoma was distinguished by the following features —(1) It was a diffuse sarcoma in the outer half of the globe, slightly pigmented and composed of spindle cells. (2) It contained cartilage. (3) It gave rise to a staphylomatous protrusion of the attenuated sclerotic.
C. MARKUS.

XII.—INTRA-OCULAR TUMOURS.

(1) **Napp.—On rare tumours of the eye. (Ueber seltenere geschwülste des Auges.)** *Zeitschrift für Augenheilkunde*, Dezember, 1908.

(2) **Buchanan, Leslie. — Intra-ocular tumours.** *International Clinics*, Vol. II, 1909.

(3) **Hinshelwood, James.—A case of sarcoma of the choroid.** *British Medical Journal*, 2nd October, 1909,

(4) **Alt, Adolf.—A case of perithelioma of the choroid.** *American Journal of Ophthalmology*, March, 1910.

(5) **Roll, G. Winfield.—Sarcoma of the choroid.** *Transactions of the Ophthalmological Society* U.K., fasc. 2, 1910.

(2) In this communication **Buchanan** (Glasgow) has given a very useful summary of the principal facts as to frequency, classification, and diagnosis of intra-ocular tumours.

Dealing with the figures of the Glasgow Eye Infirmary, to which institution he was pathologist for a number of years, Buchanan states that of nearly 250,000 new patients attending in the course of twelve years, the percentage of intra-ocular tumour was 0.03, as compared with Fisher's percentage of 0.06 of cases of eye disease at a public hospital. The differential diagnosis between tumour in the first stage and simple detachment of the retina and between tumour in the second stage and acute glaucoma is very thoughtfully considered. In connection with the latter the author says, "Recently I have suggested a point which has proven of assistance in two cases of this nature—namely, that after the opening of an eye for the performance of iridectomy, as in an ordinary glaucoma, the tension be felt lightly, and if the tension is very distinctly lowered after drainage of fluid, the case is likely to be glaucoma; whereas if the tension is not appreciably or notably lowered, the case is likely to be either tumour or intra-ocular hæmorrhage."

Another differential point taken up is that between leuco-sarcoma of children, glioma of the retina, and pseudo-glioma. After discussing the details, the writer concludes that it is rarely safe to attempt to foretell from

the clinical appearances exactly what will be found by the pathologist. For ourselves, we would willingly omit the word "exactly." From personal observation, Buchanan agrees with the view first expressed by Lagrange, *viz.*, that many of the cases in children which appear to be glioma of the retina are in reality sarcoma taking origin from the choroid. Generally speaking, the histological appearances of the growths may be identical, although the formation of tubules in the growth is more frequently seen in glioma

The article concludes with paragraphs on the latency of choroidal tumours and on secondary tumours. ERNEST THOMSON.

(3) **Hinshelwood's** case of leucosarcoma of the choroid in the posterior part of the eye was characterised by the long duration of the first stage, in which there were no symptoms except increasing failure of vision. The eye was excised five and a half years after the onset of defective vision without having ever presented any other subjective symptom of intraocular tumour, although ophthalmoscopically the tumour-mass was obviously increasing in size. ERNEST THOMSON.

(4) The pathological details of **Alt's** case of perithelioma of the choroid can only be appreciated in the original. The point of clinical interest is that the tumour followed an injury to the eye. A woman, aged 62 years, had been severely injured two years previously by a snowball. This was followed by very severe inflammation and partial loss of vision. The inflammation (treated at home) subsided in about two months, though vision remained poor. About two months before consulting Alt, she lost the sight altogether in a sudden manner, and then intense pain came on and persisted. High tension and no fundus-reflex. On opening the eye after its excision, the retina was found totally detached, while a tumour sprang from the temporal side of the choroid. This tumour was considered, after histological examination, to belong to the rare variety of angiosarcoma known as perithelioma. "That an injury may be the starting point for the growing of an intraocular tumour is nowadays pretty well accepted. * * * * The history of our case also shows an injury preceding the growth of an intra-ocular perithelioma. What the injury was it is not possible to say definitely. Yet, among the most frequent results of an injury to the eye from a missile like a snowball, a rupture of the choroid is surely to be counted. Since our tumour is an angiosarcoma, it is not impossible, it seems, that it owes its origin to such an isolated rupture."

ERNEST THOMSON.

XIII.—REFLEX OCULAR NEUROSES.

(1) **Gould, George M.**—A remarkable case of epilepsy caused by eyestrain. *Buffalo Medical Journal*, May, 1908.

(2) **Ziegler, S. Lewis.**—Reflex neuroses arising from ocular and nasal abnormities. *New York Medical Journal*, November 7th, 1908.

(3) **Theobald, Samuel.**—Reflex aural neuroses caused by eye strain. *Journ. Amer. Med. Association*, July 10th, 1909.

(4) **Risley, Samuel D.**—Psychoses associated with ocular affections. *Pennsylvania Medical Journal*, February, 1910.

(5) **Doyne, Robert W.**—A lecture on the value and misuse of spectacles in the treatment of headache, migraine, and other functional troubles of the eyes. *British Medical Journal*, August 13th, 1910.

(6) **Lagrange.**—Anomalies of refraction and facial "tics" in the child. (Anomalies de la réfraction et tics de la face chez l'enfant.) *L'Ophtalmologie Provinciale*, octobre, 1910.

(1) **Gould**, of Ithaca, relates the case of a child, 4 years of age, who suffered from epilepsy (*petit mal* and *grand mal*) and had done so for a year or so. The attacks ranged in number from 437 to 969 per month, and of these the severest convulsive seizures (*grand mal*) numbered from 5 to 25 a month. With atropinisation of the eyes, the total number of attacks was reduced by about one hundred during the following month. Bromide, which had been administered apparently in massive doses, was now stopped, and glasses were prescribed which corrected the compound hyperopic astigmia that was present. The rest of the tale may be told in Gould's own words:— "In the next month, December, after getting the spectacles, although the number of severe convulsive seizures increased somewhat, the total number fell from 404 to 157. In January the total number fell to 85, and in February to 7. Illness in the family during the spring of 1907, made necessary a change of residence for the boy The journey to another city and the far more irritating environments resulted in a slight increase in the number of seizures. With return to the old home and better conditions, during the summer, six weeks went by without a seizure. At the present time, March, 1908, six months have passed with but two or three slightest *petit mal* hardly noticeable symptoms. The boy is at last natural-minded, and healthy-bodied, "plays with the other children, as a normal child" "His eyes have a bright and normal expression." "He drives a pony, telephones, wears his glasses constantly," etc. "He weighs 67½ lbs." SYDNEY STEPHENSON.

(2) While this oration in ophthalmology on reflex neuroses of ocular and nasal origin by **Ziegler**, of Philadelphia, contains little that is new, it may be commended as an interesting, and at times amusing account, of the gradual standardization of our knowledge, from the time when Donders in 1864 called the attention of the medical world to the relief of "asthenopia" by glasses up to the present day. Living as well as dead writers have truths told about their enthusiasms, disillusionments, and changes of view, especially regarding muscle errors. As regards nasal asthenopia, the three most active ætiological factors are: (1) pressure contact (usually of the middle turbinate against neighbouring parts) (2) hyperæsthesia (3) nasal obstruction. The author considers "Sunday morning headache" to be usually nasal in origin, the result of prolonged pressure contact following over-indulgence in sleep. "Monday morning headache" is more liable to be ocular, resulting from excessive Sunday reading. "The eye and the nose are undoubtedly most important factors in the ætiology of reflex neuroses, and should, therefore, be thoroughly examined and positively excluded before beginning a search for other causes." ERNEST THOMSON.

(4) **Risley**, of Philadelphia, reports a number of cases of psychoses, one a case of insanity, another of *petit mal*, and several of nervous exhaustion and suffering with severe pain and mental dread, all of which were relieved by the correction of errors of refraction and muscular imbalance. While in each of his cases there existed an error of refraction, especial emphasis is placed upon the fact that there was a significant relation between the amount of error in the two eyes and upon the muscular imbalance that was present in each case. In one case the correction of the ametropia gave little or no relief; but almost immediate and complete relief followed a tenotomy for the correction of a left hyperphoria of 4°. The ocular defects found in these patients are those which are quite frequently found, so that for the production of these psychoses another factor is essential, *viz.*, an unstable nervous system, either inherited or acquired.

These three questions are asked: (1) How can eye-strain, primarily a muscular phenomenon, produce the psychologic symptom-complex here

recorded? (2) Why should constant tension upon a group of muscles innervated by the oculo-motor disturb or confuse what Dr. Mills has designated the concrete or steriognostic mental concept formed in the higher visual areas? (3) How may we account for these hallucinations, this fear of impending evil, the confused, distorted, or deranged mental concepts? Answers are not given, but it is suggested that exhaustion, irritation or, it may be, a variation in the blood supply of the cortex in and near the primary or lower visual areas would be sufficient cause for the symptom-complex as noted, since it is conceivable that either a congestion or an anæmia of the primary perception centres would modify the distribution of the visual perceptions to the higher visual areas. Having in view the still uncertain state of our knowledge regarding the oculo-motor nucleus, its relation to the optic nerve, and its ramifications and distribution; and still more the vagueness of our understanding regarding the influence of the vasomotor nerves, as supplied to it through the ciliary ganglion, over the dilatation and contraction of the blood-vessels, one does not feel disposed to indulge in dogmatic statements

Certain it is that when the tension upon the eyes was removed and rest secured, the symptoms disappeared.—*American Journal of Ophthalmology.*

(5) **Doyne,** of London and Oxford, raises his voice against the indiscriminating employment of glasses for ills, all and sundry. In a word, he protests against the promiscuous prescribing of spectacles. At the same time he is as conscious as anybody of the benefit that follows their employment in suitable cases.

His communication is largely devoted to endeavouring to show what these cases are. The principal disturbances caused by refractive and muscular errors of the eyes may be roughly divided into peripheral and central. The first-named include pain at the back of the eyes, pain at the brow, tender and bruised feeling of the eye, heaviness of the lids, pain at the inner canthi, pain at the nape of the neck, and morning discomfort, while the central disturbances comprise headache, sickness, sleepiness, polyuria, and migraine. Pain at the nape is perhaps always associated with heterophoria. As to the central group of manifestations, they are attributed by Doyne to disturbance of the higher brain centres, especially the fusion centre. That the fusion centre is the chief factor in the causation of these disturbances is shown by the fact that one-eyed people, or squinters, seldom suffer from functional trouble dependent upon the eyes. This view is further supported by the fact that the commonest underlying ocular factor is not astigmatism, as generally taught, but anisometropia. The focussing centre, however, may also be concerned. Briefly, then, in Doyne's opinion, the symptoms grouped as "ocular headache" are the outcome of action and reaction of the fusion centre and the lower centres upon which it relies, the continual effort to fuse dissimilar images, the constant call on the accommodation to produce and to maintain perfect images, together with the constant tendency to failure from exhaustion.

Ocular headaches are generally frontal in distribution; affect patients of the thin, neurotic type; are common after employing the eye on detail; and are often associated with, or followed by, polyuria. Tender eyeballs, too, are commonly complained of. The headache may terminate in sickness, which usually affords relief. It is specially apt to appear when the general bodily vigour is lowered from any cause. Functional symptoms are rare in association with myopic errors of the eye, although there, again, the fusion centres are concerned. The connection between refractive errors and migraine is so common that, in Doyne's view, it is quite beyond the possibility of a mere coincidence. But migraine sometimes attacks centres other than those for sight, and spreads to the latter at a subsequent period.

Speaking of the treatment of the several conditions, Doyne lays stress upon the necessity of improving the well-being and general health of the patients, as by the administration of iron and arsenic, attention to the digestive tract, and graduated physical exercises. The actual attack may be cut short by strong mental or physical exercise, or by such drugs as phenacetin, antipyrin, or aspirin. When dealing with slight symptoms of eyestrain in a patient whose hyperopia amounts to less, say, than 2 D., or who suffers from a small muscular error, Doyne does not immediately assume that glasses must be worn always or even for near work. Under such circumstances, although glasses may be required as a temporary expedient, the amount of work should be moderated, and the ciliary muscle should be trained by regular and increasing use to do the work required of it. Doyne's contention is, that the treatment to be adopted in functional failure is by exercise and not by rest. To borrow his own picturesque expression, the ciliary muscle should be "Sandowed," so as to enable it to become equal to its responsibilities. This advice, the abstractor would incidentally remark, takes one back to the days, now long past, when systematic exercises of the eye were recommended by Dr. Ezra Dyer, of Philadelphia, under similar circumstances. Such measures, it need scarcely be remarked, apply to low degrees of hyperopia alone. The higher degrees are altogether beyond the power of the ciliary muscle, and must, of course, be treated by glasses.

Heterophoria must sometimes be corrected, although Doyne believes that it is advisable "to hold off doing so if you can." His point seems to be that to correct such errors leads to the demand for constant glasses. At the same time one-half the amount of exophoria may often, in his experience, be corrected with advantage, and stress is laid on the necessity of full correction, if necessary, of esophoria not associated with abnormal refraction. Again, instances of hyperphoria that require glasses are among those that should wear them for all purposes.

Doyne believes that relief can be given in headache and migraine only if the glasses are worn constantly. The headaches of middle-age can generally be relieved by giving proper presbyopic glasses, unless monocular diplopia is present, when glasses must be prescribed for constant wear. When glasses are given for constant use, Doyne prescribes the most exact correction, but in other cases he does not correct in detail the error in each eye, since he fears to upset in any way the relative condition of one eye to the other. He maintains that for true comfort the eye should always be used under the same relative conditions. To put the matter in another way, astigmatism or anisometropia should not be corrected unless glasses are to be worn constantly, and this is especially the case when dealing with a presbyopic patient. "The only disadvantage of this doctrine," remarks the author, "is that it encourages men to do slipshod work, but it is no excuse whatever for not working out the errors that you are not going to correct them." Myopic children should wear fully-correcting glasses for all purposes.

SYDNEY STEPHENSON.

(6) **Lagrange**, of Bordeaux, first draws attention to ocular torticollis, and then passes on to consider cases of facial "tic" in children (so-called "habit-spasm") definitely under the control of glasses.* He relates two typical and severe cases of this kind in children, aged respectively 11 and 11½ years. Both were freed from their symptoms on wearing glasses for all purposes.

SYDNEY STEPHENSON.

* The reviewer drew special attention to these cases in the columns of the *British Medical Journal* of September 18th, 1909, p. 751.

XIV.—EPIBULBAR SARCOMA.

(1) **Foster, John Robert.**—A case of epibulbar sarcoma. *Lancet*, April, 1906.

(2) **Foster, John Robert.**—A case of epibulbar sarcoma. *Ophthalmic Review*, June, 1907.

(3) **Veasey, C. A.**—Report of a case of epibulbar sarcoma. *Ophthalmology*, July, 1910.

(1) **Foster's** peculiar case was in a boy, aged 4 years, who presented in the space between the eyelids on the outer side of one eye a dark growth, some 4 mm. in diameter. The growth was present at birth, but had become larger. After two operations, no recurrence in thirteen months. The original tumour, when examined histologically, was found to be a congenital mole, and the recurrence an alveolar sarcoma. SYDNEY STEPHENSON.

(2) Considerable diversity of opinion exists as to the malignancy of epibulbar sarcomata. Strauss and others say that they never penetrate the globe, while Verhoeff and Loring regard them as highly malignant, both locally and generally.

In order to help settle the question, **Foster** records the case of a boy, 4 years of age, who had on the outer side of the right eyeball, in the interpalpebral region, a small dark growth about 4 mm. in diameter, which was freely moveable on the eyeball. It had been present since birth, but had recently got larger. The growth was freely removed; five months later a recurrence was noted, and this was again removed very freely. The second operation was performed more than two years before the case was recorded, and there was no sign of recurrence. The microscopic examination of the mass first removed showed it to be a congenital mole, but the recurrence was "undoubtedly sarcomatous." Although the first mass removed was a mole, there could be no doubt that it was a mole which was developing into a sarcoma, and was thus increasing in size. C. DEVEREUX MARSHALL.

(3) **Veasey's** patient was a woman of 40 years. At the age of ten she received an injury to the right eye by a slate pencil, which penetrated the ciliary region at the temporal side of the cornea. After the injury, a dark spot was always visible at that point. Twenty-four years after the injury, a small growth developed on the site of the perforation. This was removed, but recurred. The tumour was excised and recurred altogether four times, and then the eye was enucleated. No signs of recurrence, either local or metastatic, had appeared after sixteen months. The growth was a mixed round- and spindle-cell sarcoma A. J. BALLANTYNE.

XV.—VITILIGO.

(1) **Sautter, Albert C.**—Vitiligo iridis: Report of two cases. *Annals of Ophthalmology*, Vol. XIX, April, 1910, p. 242.

(2) **Gilbert, W.**—Vitiligo and eye; a contribution to the knowledge of herpetic eye diseases. (Vitiligo und Auge; ein Beitrag zur Kenntnis der herpetischen Augenerkrankungen.) *Klin. Monatsbl. f. Augenheilkunde*, Juli, 1910.

(1) **Sautter** describes two cases of this interesting condition.—The first was in a coloured woman, aged 27 years. In the right brown iris there were from eight to ten greyish-white, circular, and irregularly ovoid spots, about ½ mm. in diameter, and principally located in the ciliary zone. In the left iris there were about six similar non-pigmented areas, most of these, too, being present in the ciliary zone of the iris. The irides otherwise presented normal appearances, and reacted to light. The media were clear, and there was no visible pigment disturbance in the fundus. The patient had measles thirteen years ago and variola seven years ago. No history of previous ocular disease could be elicited. The second patient was a 60-year old coloured man. In both eyes there were signs of a chronic irido-cyclitis, the vision of the right eye being reduced to 1/60 and that of the left to 6/20. In the lower portion of the left brown iris were four greyish-white spots, about ½ mm. in diameter, none being discovered in the right eye. The man had variola 27 years ago.

There was no question about either patient having had variola, well-marked pitting being present in both cases. In neither case was there any atrophy of the iris tissue. The spots appeared to be due to an absence, or bleaching of, the stroma pigment, the adjoining iris tissue being unchanged, at least to gross inspection. Some of the lesions appeared to be in a plane slightly behind the anterior surface of the iris. Transillumination showed the pigment layer to be intact. JOHN WHARTON.

(2) **Gilbert's** case was that of a man, aged 38 years, who one year after the first appearance of symptoms of vitiligo began to suffer from bilateral optic neuritis and iritis, these eye-affections having a chronic character with a tendency to acute exacerbations. In the acute stage the iritis was distinguished by nodular swellings at the pupillary margin and extensive hæmorrhages from dilated vessels of the iris. No cause was found for vitiligo or the ocular disease, but it may be mentioned that a cancerous growth was removed from the patient's axilla. Gilbert claims an herpetic nature for the eye affections and views both vitiligo and ocular manifestations in the light of herpetic disorders. C. MARKUS.

XVI.—REMEDIES.

(1) **Rampoldi, R.—The therapeutic action of jequirity in some cases of cancer.** *Annali di Ottalmologia*, Vol. XXXVI, fasc. 3-4.

(2) **Cecchetto, E.—Picric acid in the treatment of ulcus serpens.** *Annali di Ottalmologia*, Vol. XXXVIII, fasc. 8-10.

(3) **Motolese, F.—Picric acid in ocular therapeutics.** *Annali di Ottalmologia*, Vol. XXXVIII, fasc. 8-10.

(4) **Rampoldi, R.—A further note upon the action of jequirity in some cases of cancer.** *Annali di Ottalmologia*, Vol. XXXVIII, fasc. 11-12.

(5) **Gallenga, C.—On paraspecific treatment by anti-diphtheritic serum in some forms of ocular infection.** *Annali di Ottalmologia*, Vol. XXXIX, 1910, fasc. 1-2.

(6) **Hummelsheim, E.—Tuberculin treatment in diseases of the eye.** *Arch. f. Augenheilkunde*, April, 1910.

(7) **Ollendorf, A.**—On sub-conjunctival injections of fibrolysin. *Zeitschrift f. Augenheilkunde*, 1910.

(8) **Ohm, J.**—Band opacity of the cornea in a girl aged nine years, and its treatment with sub-conjunctival injections of potassium iodide. *Klin. Monatsbl. f. Augenheilkunde*, August, 1910.

(9) **Steindorff, Kurt.**—The action of atoxyl on the eye. *Lancet*, October, 15th, 1910.

(10) **Heller, Isaac, M.**—Three cases of acute glaucoma treated with sub-conjunctival injections of sodium citrate. *Annals of Ophthalmology*, October, 1910.

(11) **Berry, G. A.**—The future of ocular therapeutics. *Brit. Med. Journal*, October 29th, 1910.

(12) **Harman, N. Bishop and Morton, Reginald.**—The use of carbon dioxide snow in eye work. *Brit. Med. Journal*, October 29th, 1910.

(13) **Lawson, Arnold and Davidson, J. Mackenzie.**—Radium therapy in eye disease. *Brit. Med. Journal*, November 12th, 1910.

(1) In this preliminary communication **Rampoldi**, of Pavia, announces that in several cases of epithelioma of the face or eyelids he has obtained very good results by the application of the small gelatine discs of jequiritine prepared by the firm of Zambelletti, of Milan. This preparation, or even the fluid extract of jequiritine, acts better than the simple maceration of jequirity, which is liable to undergo changes quickly. A. ANTONELLI.

(2) This short note by **Cecchetto**, of Parma, confirms the good results obtained from a 2 per cent. ointment of picric acid* in eczematous blepharo-conjunctivitis, lime burns of the eye, traumatic keratitis, and, in particular, ulcus serpens. The application is made twice a day. From the first use of the ointment, the *detritus* of the corneal ulcer, examined with the microscope, shows a considerable diminution and the micro-organisms speedily disappear. Hypopyon resorbs, and vascularisation and repair of the corneal lesion occur, and the ulcer heals with the smallest possible scar. A. ANTONELLI.

(3) The conclusions reached by **Motolese**, of Florence, regarding picric acid in eye work are the following—Picric acid possesses astringent properties of a very pronounced description, superior to those of zinc sulphate, alum, and neutral lead acetate, but inferior to those of the basic lead acetate, tannic acid, and silver nitrate. Its diffusibility is great; for it belongs to the group of electrolytes. Its purely aqueous solution, conformably with the theory of dissociation, possesses a bactericidal action superior to that of the hydro-glycerine solution; it is also more diffusible and less irritating. The simple watery solution, then, should be preferred: its antiseptic power is remarkable, as well as its favourable influence upon the processes of repair in lesions of the cornea. Picric acid is very useful in blepharitis. In purulent conjunctivitis the silver salts are preferable, although picric acid is indicated when corneal complications are present. Its use is not to be recommended in granulous conjunctivitis. On the contrary, it is almost specific in pseudo-membranous conjunctivitis. It is especially in ulcerative keratitis, particularly in the torpid forms, or during the period of repair in hypopyon-keratitis, or in traumatic lesions of the eye, or in burns, that picric acid is eminently useful.
A. ANTONELLI.

* Picric acid has been employed by Fortunati and by Valenti.

(13) In the present communication **Lawson** and **Davidson,** of London, resume the results they have obtained in diseases of the eye with radium (see THE OPHTHALMOSCOPE, 1909, p. 790, and 1910, pp. 467 and 676).

After describing the method of application, the dose, and the length and frequency of exposure, the authors pass forward to consider the results. A few hours after application of the radium, some of the patients complained of pain, occasionally severe enough to cause a sleepless night. As a rule, it passed away in twenty-four hours, and was seldom severe. After the initial discomfort (supposing there to be any) has worn away, the patients usually experience a rapid improvement in the subjective symptoms from which they suffered, and this speedy "anæsthesia," as the authors call it, is a very striking feature of the treatment. It is gratifying to note that in no single instance did any untoward inflammatory exacerbation result from the application of radium. Smooth and supple cicatrices followed the use of radium in cases of spring catarrh, a disease in which radium is said to act as a specific cure.

The cases treated by radium are grouped under four heads:—1. *ulcerations of the cornea;* 2. *non-ulcerative acute inflammations of the cornea and sclerotic;* 3. *affections of the lids;* and 4. *corneal scars.* As to the first group, which included seventeen cases, results were good with a single exception, where failure was believed to be due to continuous infection of the ulcer from a septic state of the lids. The rapidity of improvement after the first exposure to radium was a striking feature in almost every case; and so was the rapidity of healing, when it had once commenced. The length of convalescence necessarily varied very considerably. As to the second group, the authors speak with caution as to the effect of radium upon the seven cases of interstitial keratitis treated by the agent. Considerable benefit, however, followed the applications in cases of recurrent episcleritis and of inflamed pterygium. Special attention is directed to the influence of radium on cases of spring catarrh. Large doses of the remedy must be employed. With regard to the treatment of corneal scars (four cases) the results obtained were not very encouraging, although the authors suggest that large doses of radium applied continuously at intervals of three weeks or so over a period of some months might effect an improvement. Although cases of trachoma are not included in the cases treated by Lawson and Davidson, yet it is suggested that radium will eventually prove to be a specific for that disease.

Finally, the authors deplore the present prohibitive price of radium, which precludes anything like its general employment, and they deprecate its collection in institutions for the purpose of obtaining prodigious fees from the public.

SYDNEY STEPHENSON.

XVII.—REFRACTION, ACCOMMODATION, VISUAL ACUITY, etc

(1) **Mayer.—On the numbering of the spherical lenses of short focus. (Sur le numérotage des lentilles sphériques à courts foyers.)** *Ann. d'Oculistique*, T. CXL, p. 419, décembre, 1908.

(2) **Reeve, Jesse N.—Refraction for men who shoot.** *Ophthalmology*, Vol. V, July, 1909.

(3) **Duane, Alexander.—A standard test object for determining the near point and the range of accommodation.** *Ophthalmic Record*, August, 1909.

(4) Pergens, Ed.—The examination of elemental vision. (Examen de la vision élementaire.) *Comptes Rendus, 13th Congress of Ophthalmology*, Naples, 1909.

(5) Nicati.—Remarks on the agreement with regard to the determination of visual acuity. (Commentaires à propos de l'entente sur la détermination de l'acuité visuelle.) *Ann. d'Oculistique*, août, 1909.

(6) Mayer.—A memoir on the prescription of spherical lenses. (Mémoire sur les ordonnances de lentilles sphériques.) *Ann. d'Oculistique*, novembre, 1909.

(7) Maklakow.—The changes in the dioptric elements of the eye during accommodation (measure made with Dr. Tscherning's ophthalmophakometer). [Modifications des eléments dioptriques de l'œil pendant l'accommodation (mensurations faites avec l'ophthalmophakomètre du Dr. Tscherning.)] *Ann. d'Oculistique*, décembre, 1909.

(8) Lauder, Edward.—A study of heterophoria and heterotropia in duction and version. *Ophthalmology*, January, 1910.

(9) Armaignac.—Vision and the various optometric types from the clinical and medico-legal standpoints. (La vision et les divers échelles optométriques au point de vue clinique et médico-légal.) *Recueil d'Ophtalmologie*, avril, 1910.

(10) Galloway, A. Rudolf.—The Board of Trade sight-tests. *British Medical Journal*, 16th April, 1910.

(11) Fridenberg, P.—A stigmometric card test for illiterates. *Archives of Ophthalmology*, May, 1910.

(12) Verwey, A. (Rotterdam).—On the accuracy of estimating distance with the monocular parallax. (Ueber die Genauigkeit des Tiefensehens mittels der monocularen Parallaxe.) *Arch. f. Augenheilk.*, Mai, 1910.

(13) Gleichen, A. (Berlin).—On the position of the pupil in the optical system of the human eye. (Ueber die Stellung der Pupille innerhalb des optischen Systems des menschlichen Auges.) *Arch. f. Augenheilk.*, Mai, 1910.

(14) Oreste.—On the direction of the principal meridians of the astigmatic eye in relation to lateral inclination of the head. (Direction des méridiens principaux de l'œil astigmate en rapport avec l'inclinaison latérale de la tête.) *Ann. d'Oculistique*, juin, 1910.

(15) Alexander, Major G. F., R.A.M.C. (ret.).—An erect image of the fundus by indirect ophthalmoscopy. *Ophthalmic Review*, July, 1910.

(16) Campos.—Practical measurement of the separation of the visual lines and determination of the base line: application to the prescription of glasses. *Revue Générale d'Ophtalmologie*, 30 septembre, 1910.

(17) Dor, H.—Bifocal glasses. (Les lunettes à double foyer.) *Revue Générale d'Ophtalmologie*, 30 septembre, 1910.

(18) **Caillaud.—A comparative study of several forms of test type.** *La Clinique Ophtalmologique*, 10 octobre, 1910.

(19) **Morrell, Reginald A.—Preliminary observations on some cases of esophoria not caused by refractive errors.** *Lancet*, 29th October, 1910.

(1) **Mayer** criticises the proposal of the British Optical Society to number *plus* lenses not according to their real power but according to the strength of the *minus* lens which neutralises them. He endeavours to prove that the only logical way of numbering lenses is according to their true strength, and to show how this can be done, and how the accuracy of such high *plus* lenses can be verified by neutralisation with spherical *minus* lenses of small diameter as previously suggested by him (*Ann. d'Oculistique*, février, 1908). R. J. COULTER.

(2) **Reeve's** recommendations to those prescribing lenses for shooting are to examine under a cycloplegic, even at the age of 50 or more, unless it is contra-indicated, to correct every error, no matter how insignificant, and always to order the full correction. Toric lenses should be ordered, but if these cannot be used, the lens should be incorporated with the peep-sight of the rifle. Amber glass may be used for protection. A. J. BALLANTYNE.

(3) **Duane's** test object, which it is claimed is better for various reasons than many other test objects, is made up in the following way.—A disc, 38 mm. in diameter and covered with black velvet, is set in a ring. The ring and handle are blackened. On the centre of the disc is glued a white card 3 mm. by 1·25 mm. which is exactly bisected by an engraved black line, 33 mm. long and 0·2 mm. thick. The measurement of the near-point is made by approximating the card until the engraved line blurs. The author prefers to make the measurement from the anterior focus of the eye, *i.e.*, from a point 13 mm. in front of the cornea. ERNEST THOMSON.

(4) **Pergens** has designed a number of figures (to each of which a name is applied such as "locus," "angulus," "separatio prima," "separatio secunda," etc.) as test objects supplementary to ordinary test-types. The article does not lend itself to abstraction.* ERNEST THOMSON.

(5) **Nicati** discusses the conclusions of the Eleventh International Ophthalmological Congress at Naples with regard to the determination of visual acuity. He approves the retention of most of Snellen's principles.

(6) **Mayer** discusses the following questions in his article.—1. Within what limits can the distance between spectacle lenses and the eyes of the wearer be varied without appreciably altering the vision? 2. If it is necessary to exceed these limits, what change should be made in the prescription? 3. The strength of a lens remaining equal, what is the influence of (a) the curvature of its two surfaces, (b) its size, (c) its refractive index? He embodies his results in nineteen tables. R. J. COULTER.

(7) From the results of the examination of 40 eyes with a modification of Tscherning's ophthalmophakometer, **Maklakow**, of Moscow, draws the conclusion that the accommodative effort commences by changing the anterior surface of the lens, and it is only later that the change in the posterior surface commences to play the principal *rôle*. He finds that the thicker a lens the less its thickness increases during accommodation, and supports Tscherning's theory because he calculates that, according to his measurements, if the changes in the radii of curvature were due to a slackening of the zonule of Zinn it would be necessary for the lens to increase in volume. He explains the increase in the curvature of the posterior surface of the lens as due to deepening of the cup of the vitreous from pressure on its edges by the ciliary muscle, but is unable to account for the fact that in some of his cases there

*See THE OPHTHALMOSCOPE, October, 1910, p. 768.

was no increase or even a diminution in the curvature of this surface. He found the increase of curvature of the posterior surface of the lens greatest in hypermetropes and that of the anterior surface in young subjects, the latter probably because the anterior parts of the lens, being the oldest, are the first to lose their elasticity. R. J. COULTER.

(8) By "duction" **Lauder** means the functional power of the ocular muscles as tested by means of prisms, while "version" indicates the same as recorded by the tropometer. The results of these two tests are not always in perfect agreement The author in all cases employs both tests, but the object of his paper is to illustrate the truth of his contention that the tropometer is an instrument of the greatest value in the study of disturbances of the muscular balance of the eyes. Eleven cases are described, and they belong respectively to the classes of exo- and esophoria, hyperphoria, and heterotropia. He practically discards the idea that the heterophorias are binocular defects, for he seeks with the aid of the tropometer for errors in the individual muscles, and applies advancement, tucking, or graduated tenotomy to the relatively weak or strong muscle. In the two cases of hyperphoria here given he found a distinct difference in the power of upward version in the two eyes by means of the tropometer, and his treatment, apparently justified by success, consisted in advancement of the weaker superior rectus.

The author's ideas on the pathology and treatment of these conditions being at a discount in this country, his arguments will probably not receive much attention. When we come to his cases of squint, we are at a loss to account for his enthusiastic claim that for those who have never used the tropometer in these cases there remains a revelation in store. In order to contrast his work with current practice, he quotes a number of text-book utterances on the treatment of squints, most of which would not be considered up-to-date in this country, and the treatment adopted seems to be that most in favour here, namely, advancement of the external rectus of the squinting eye (internal rectus in divergent squint), aided, if necessary, by tenotomy of the antagonist.
A. J. BALLANTYNE.

(9) **Armaignac** lays down the following requisites as essential in test types with which proper comparisons of results can be made :–

1. The letters or figures should subtend an angle of 5′ and their black and white sub-divisions an angle of 1′ (*minimum separabile*).

2. The letters or figures should be simple and equally suitable for those who can read as for illiterates of all nationalities.

3. The types should be divided up into graduated sets sufficiently numerous to indicate exactly the visual acuity between the minimum (taken as $\frac{1}{10}$) and the maximum (taken as 1).

Nearly all modern test-types comply with the first condition, with the exception of the International Test-types, adopted by the Naples Congress, in which the maximum (normal) vision is represented by figures 6 mm. (instead of 7·3 mm.) in height; and Dehenne test-types, in which the same line consists of letters 6·6 mm. in height.

In reference to the second condition, there is the greatest variety of opinions.

Armaignac is convinced that the trident E is the best international and universal test to use. He finds it advantageous to use a second set of types, consisting of capital letters as adopted by Snellen. In each case he has several letters to a line, so as to preclude the possibility of the patient committing the letters, or the position of the E, to memory.

He severely criticises the International types of the Naples Congress, which consist of a double test board, one made up of a double series of figures (different arrangements in pairs of 4, 7, 1, 0), and Landolt's broken ring. The

figures cannot be regarded either as "international" or "universal," and it is comparatively easy for an educated person, with normal vision, to confuse the 7 and the 1. It would also be quite easy for anyone to commit the figures to memory, and thus for defective vision, in applicants for railway and other appointments, to escape detection. The same remarks apply to the solitary C of Landolt, which is also said not to conform to the principle of the *minimum separabile*.

An advantage of having a number of letters in each line is that small variations in vision can be noted by indicating a greater or smaller number of letters read in the same line. This is impossible with the International types. Another desirable feature in test-types is that the gradation in the size of the letters or figures should be uniform. In this respect the International types are very defective, as the first line indicates a vision of $\frac{1}{10}$ and the second a vision of $\frac{2}{10}$. In the estimation of the working capacity of an injured workman it is often of the utmost importance to know the exact vision between these two, and to assume that a patient's vision is only $\frac{1}{10}$th because it is not $\frac{2}{10}$th, might lead to a grave injustice to an applicant for a post or to an Insurance Company in a claim for compensation. Further, as the "unity" line of the International types consist of figures 6 mm. in height, it represents a visual acuity of $\frac{1}{10}$ths on other test-types. Such an acuity is exceptional, and insistence upon it would lead to frequent rejections for the services.

The discrepancies in the readings of different test-types are thus recorded :—

Congress.—		*Monoyer.*—	*Armaignac.*—	*Dehenne.*
Tenths 1	=	1	2	1·50
2	=	3	5·50	6·50
3	=	3·50	6·50	7·50
4	=	5	7	8
5	=	6	8	8·50
6	=	7	8·50	8·75
7	=	8	9	8·90
8	=	10	10	9
9	=	10	10·75	10
10	=	10	11	10

It will be seen that the discrepancies in these estimates are sufficient to give rise to great differences of opinion as to the working capacity of workmen, and the table shows forcibly the necessity of adopting test-types of more uniform construction and more truly universal in character.

Monoyer's types have also the defect that the gradations are not uniform, being too coarse for the lower degrees of vision (of International types) and too fine for the higher degrees.

The gradations in Dehenne's types are uniform and proportional, except those between 8, 9, and 10—the difference between the latter being insignificant, while that between $\frac{9}{10}$ and $\frac{8}{10}$ is enormous. Further, the line corresponding to $\frac{1}{10}$ in other types is represented as O, and the letters in the $\frac{1}{10}$ line are too small. It might happen, therefore, that a patient whose vision was less than $\frac{2}{10}$ would claim for the complete loss of his eye. On the other hand, it would be exceptional to find an injured (or even uninjured) patient who had not lost $\frac{1}{10}$th of his vision, according to this test, in which ordinary normal vision is represented by the $\frac{9}{10}$th line. But he would have to lose a good deal more sight before he would be registered as $\frac{8}{10}$. This latter vision would read $\frac{7}{10}$ on Armaignac's test, $\frac{5}{10}$ on Monoyer's, and $\frac{4}{10}$ on the International!

J. Jameson Evans.

(10) The twelve illustrative cases by **Galloway,** of Aberdeen, should be studied in the original. Some of them are certainly illustrative, not to say illuminative, of the Board of Trade methods in this matter. The twelfth case will take a lot of beating.—A fisherman had his mate's certificate withdrawn because he failed in eye-sight examination. Galloway refused to give him a certificate of fitness. The man then re-entered under an assumed name, passed all the tests, and obtained his certificate. He then wrote and informed the officials what he had done, was summoned to a fresh examination, was rejected, and once more lost his certificate. ERNEST THOMSON

(11) **Fridenberg's** card is composed of square dots the size of which and their spacing correspond exactly to those of the Jaeger test-types; the dots are arranged in lines like ordinary text, but in groups of varying formation

(14) **Oreste** has investigated subjectively and objectively the effects of lateral inclination of the head on the axis of astigmatism and draws the following conclusions from the results obtained:

(*a*) When an astigmatic person inclines his head laterally, the eye, in the great majority of cases, rotates in the opposite direction around its antero-posterior axis, which has the effect of partially compensating the inclination of the head.

(*b*) The compensatory movement varies from 1° to 8° with a mean of 4° or 5°, and in some subjects occurs in one direction only.

The amount of the compension is always less than that of the lateral inclination of the head, and Oreste therefore concludes that the fact that a vertical line continues to appear vertical, no matter how much the head is bent to either side, is due to psychic causes, and not to movement of the eyes.

R. J. COULTER.

(15) **Alexander's** is a mathematical communication to show that by holding a concave lens of focal length F. mm. before the eye, whose focal length may be taken as 15mm., an erect image of the fundus can be seen magnified F/15 times, *e.g.*, with a—13 D. lens about 5 times. The illumination must be good, pupil dilated, the lens held as close to the eye as possible, and the observer's eye within a few inches. A magnified view is obtained "in which the parts remain correlated as they are in the fundus."

A. H. PAYAN DAWNAY.

(16) There does not seem to be anything very original in the plan detailed by **Campos** of obtaining the proper centration of glasses. Two discs with stenopaic holes are mounted in an adjustable trial frame. The discs are moved laterally until the luminous point used for fixation appears in the centre of a single circle which is the combined image of the two holes. The distance read off on the frame mounting represents the distance apart of the visual lines, for the point fixed, in the plane passing through the two holes. He also suggests the recording of the vertical movement of the discs with relation to the nose, and the amount of inclination required for the glasses. In determining the base line a star, the moon, or even the sun (under proper precautions) is used as a fixation point: "At the almost infinite distance of the stars the visual lines may be considered parallel. The distance between the visual lines and the lines of fixation (*lignes de régard*) being negligible, the distance between the centres of the stenopaic holes represents the base line." ERNEST THOMSON.

(17) This paper on bifocal glasses by **H. Dor** (of Lyons), which appears in *Revue Générale d'Ophtalmologie*, has been already translated from *L'Ophtalmologie Provinciale*, Mai, 1910, and published in THE OPHTHALMOSCOPE for October, 1910, p. 719.

(19) **Morrell,** of London, describes, under the heading of esophoria not caused

by refractive errors, certain cases which "are not described in any text-book," and the existence of which has not been widely recognised. The patients are usually "nervous introspective persons engaged in a hard struggle for existence, or recovering from a serious illness, and who are constantly using their eyes for near work." The distant vision is good ($\frac{6}{6}$ to $\frac{6}{5}$). There is no error of refraction found under homatropin and cocain, 2 per cent. The smallest Jaeger type is read with either eye at a distance closer than normal. Sustained binocular effort results in blurring of the type. With Maddox rod test at 6 metres, no imbalance is manifest, but if a test be made, during accommodation, with Harman's diaphragm, an esophoria appears and results in confusion of the test letters. By placing a + 1 D. spherical lens before each eye all confusion vanishes, and comfort in reading is restored if + 1 D. spherical be ordered for near vision glasses. The writer explains the facts on the basis of convergence excess associated with fatigue or loss of tone of the ciliary muscle, such that the latter is unable to respond to ordinary requirements, and contrasts this with "accommodative asthenopia," in which the ciliary muscle fails to respond to excessive demand made upon it by the presence of hypermetropia.

ERNEST THOMSON.

BOOK NOTICES.

The Ophthalmic Year Book, containing a Digest of the Literature of Ophthalmology, with Index of Publications for the Year 1909. (Illustrated). By EDWARD JACKSON, M.D., THEODORE B. SCHNEIDEMAN, M.D., and WILLIAM ZENTMAYER, M.D. Denver, Colo. U.S.A.: The Herrick Book and Stationery Co. 1910.

We desire to give a cordial welcome to the seventh volume of this excellent and well-known *Year Book*. It is not necessary at this time of day to describe its arrangement. We have been interested in an examination (of necessity a cursory examination) of the present volume, in order to estimate its fulness and its accuracy. Obviously, it is a very complete digest of ophthalmic literature. That inaccuracies should occur in a book of this class is probably inevitable. At any rate, inaccuracies are to be found in this particular volume. It is perhaps only fair to refer in detail to one, which is of some importance. In *Revue Générale d'Ophtalmologie* for 31st December, 1909, appears an article by P. Gosse on the treatment of trachoma. This article is not referred to in the *Year Book*, either under the author's name, or in the index under trachoma.

On the other hand, under the name "Gosse" there is given an article on optic neuritis in adolescence referred to *Revue Générale d'Ophtalmologie*. This article does not, so far as we can find, appear in the *Revue*. One must suppose that confusion has occurred between two journals.

We would take the liberty of suggesting that the printing of authors' names in heavy type in the body of the book would be of great advantage to the student who is hunting up references against time.

The volume contains three coloured plates of fundus conditions, thirty-three figures in the text, and four portraits. The portraits are those of the late Argyll Robertson, Simeon Snell, Marcus Gunn, and George C. Harlan.

Dr. G. de Schweinitz has given up his connection with the *Year Book* and his place has been taken by Dr. William Zentmayer.

The Microscopical Methods of Examination of the Eye. Die mikroskopischen Untersuchungsmethoden des Auges. By S. SELIGMANN. Berlin: S. Karger. 1910.

This is a book which we can conscientiously recommend to laboratory workers. The selection of methods has been judicious, while at the same time no important process seems to have been omitted. Without being overloaded with detail, the instructions are clear and practical, and, so far as we have tested them, the formulæ are accurate.

The book is divided into two parts, the first dealing with histological methods in general, and the second with their application to particular regions of the eye. We do not quite like the recommendation to make incisions into the globe before fixing; this is not necessary with fixatives of a good penetrating power, such as Zenker's solution, which is justly commended by the author. The description of preservation of the globe by drying might perhaps have been omitted. Of recent methods the dry celloidin process, and the stains for fat, glycogen, neuro-fibrils, and axis cylinders, receive due consideration. No mention seems to be made of the advantages of freezing the globe before dividing it.

In the second section, the cornea, which has played so important a part in the study of histology and pathology, is naturally considered at some length. Full instructions are also given for the examination of the retina and of all its component elements. Methods of injection are not forgotten. A chapter on bacteriological staining methods, including the processes for detecting trachoma bodies and the spirochæta pallida, brings the book to a conclusion. A useful bibliography is appended to each chapter. GEORGE COATS.

The Prescribing of Spectacles. By ARCHIBALD STANLEY PERCIVAL, M.A., M.B., B.C., Cantab., Senior Surgeon Northumberland and Durham Eye Infirmary. Bristol: John Wright & Sons, Ltd. 1910. Price, 5s. 6d. net.

The volume before us consists of four chapters.—Chapter I, (15 pages) on Accommodation; chapter II, (41 pages) on Static Refraction; chapter III, (51 pages) Prisms and Ocular Deviations; and chapter IV, (37 pages) entitled "Optical Section" gives "a brief *résumé* of the principal problems that arise and the method of their solution."

We think it a pity that the distinguished author has called his book "The Prescribing of Spectacles;" in the first place, because it does not contain a great many things which a book with such a title ought, in our opinion, to contain, and, in the second place, because it contains much matter which is quite unsuited to the mental digestion of a beginner who might, relying upon the title, purchase it for his own edification.

Apart from the first two chapters, which, after all, do not add a very great deal to the knowledge of the experienced ophthalmologist for whom it must have been written, the book contains in the third and fourth chapters much that will be of interest to the aforesaid ophthalmologist if he has a mind with a natural inclination to sines and cosines. If not possessed of such inclination—and we fear Mr. Percival must admit that many able ophthalmologists are in such unfortunate plight—he will find these two chapters very stiff reading. Indeed, figures aside, the author's meaning seems here and there to elude the understanding through excessive condensation. Chapter III, on prisms and ocular deviations, is not intended to be mathematical, since the calculations are mainly in a chapter apart, but it is written by a mathematician, and it seems to present certain difficulties to the individual who does

not readily follow the logic of figures. An example of this appears in connection with the nomenclature of prisms. After describing the six different methods of denoting prisms, the author appears definitely to adopt the *centrad*. Proceeding to test convergence, he employs the Maddox prism verger, an instrument graduated in degrees of *minimum deviation*, and then, since the formula $l=\frac{10N}{D}$ (page 94)—where N represents the prism in centrads—does not suit his purpose, he must convert the value of the prism which is given by the verger into centrads. Such a use of different units does not tend towards simplification of a subject which is of a sufficiently difficult nature already.

There are many excellent points about the book. As examples we may select the tests for muscular palsies, which are exceedingly clear; the proper definition of the angles α, β, γ, and κ, which is a "felt want;" and the author's treatment of the relation of convergence to accommodation. This last calls for very close attention in reading.

In an appendix will be found "Service Regulations" from Hartridge's *Refraction of the Eye*, and some tables relative to decentration of lenses.

The volume is neatly got up in green cloth with gilt lettering, the print and paper are excellent, and we have come across very few typographical errors.

ERNEST THOMSON.

An International System of Ophthalmic Practice. Edited by WALTER L. PYLE, A.M., M.D., Philadelphia. **Therapeutics.** By DR. A. DARIER, Paris. Translated by SYDNEY STEPHENSON, London. Philadelphia: P. Blakiston's Son & Co. 1910. Price $4.00.

This volume is apparently the first of a series which forms a new "System of Ophthalmology," in which it is intended "to provide a compact and thoroughly modern digest of ophthalmic practice." It would have been difficult for the editor to have chosen a more suitable and propitious introductory volume than this of Darier. As an exponent of modern and scientific ophthalmic therapeutics, he is unrivalled, and the present volume is written in that concise and lucid style which we have been led to expect from him by the perusal of his previous publications, and particularly of Stephenson's translation of his *Leçons de Thérapeutique Oculaire*. Compared with the latter, the work before us is more comprehensive and complete, and is not so imbued with the purely personal element, which was the charm, and, in some ways, the drawback, of the "Lectures."

This volume is arranged in two main parts: i. General Therapeutics; ii. Special Therapeutics.

The first part deals with methods of diagnosis, constitutional treatment, extra-oral medication, intra-ocular and sub-conjunctival injections, serum-therapy, diaphoretics, purgatives, heat and cold, etc., photo-therapy, electricity and electro-therapy, X-rays and radium, hydro-therapy and mechano-therapy, anæsthetics and analgesics, vaso-dilators and vaso-constrictors, mydriatics and myotics, and drugs modifying conjunctival secretions—the whole occupying 179 pages, divided into fourteen chapters.

The author gives us a marvellous amount of information and detailed instruction in this comparatively small space, but as a pioneer of serum therapy, and especially of paraspecific serum therapy, we should like to have had a little more information from him as to the relative value of the methods of

administration of serum, sub-cutaneous, sub-conjunctival, intravenous, and especially oral. He does not say much about the methods of prevention of serum-sickness and rashes, although he is opposed to the use of serum as a prophylactic measure, owing to the danger of anaphylaxis. In the use of vaccine therapy, he is in favour of opsonic control, which we should have thought to be exceptional in Continental practice. The statement that "the guaiacol reaction is possibly even more conclusive (in the diagnosis of tuberculosis) than the cuti- or the ophthalmo-reaction, is one which has caused us some surprise, and made us anxious to confirm it.

The review of the numerous modern local anæsthetics is highly instructive, but we are still unable to share the author's optimistic view of dionin, which he regards as even more valuable under many circumstances than cocaine itself.

In the application of drops, Darier advises that the patient should look up *after* the drop has been put in the eye. We suppose this should really read *whilst* the drop is being put in.

In the section on special therapeutics, the treatment of the various diseases of the eye and its adnexa are described in detail.

In the treatment of malignant pustule, no mention is made of the use of Sclavo's serum, which has been so successfully employed in this country as elsewhere. We think that the advantages of excision of the lacrymal sac in chronic dacryocystitis might with advantage be emphasized a little more.

Rampoldi's treatment of epithelioma is mentioned, but the description is not sufficiently detailed to enable the surgeon to apply it without reference to other works. The author gives us a valuable critical review on the operative treatment of cataract, and his statement that half his cases are treated on the ambulatory plan, will be received with no little surprise in this country. He makes no reference to the use of intra-ocular injections of sterilised solution of sodium chloride after large loss of vitreous.

Reference to Bjerrum's diagnostic method in glaucoma is also wanting, and he makes little mention of filtering cicatrices in glaucoma beyond a cursory reference to Lagrange's operation. Thomson Henderson's views on the pathogenesis of glaucoma are not mentioned. In support of the advantage of the mercurial treatment in retinitis pigmentosa, the results of tests by means of the Wassermann reaction might have been quoted.

The translation of the work has been admirably done, and it has been a pleasure, as well as an education, to read this masterpiece in English notwithstanding the numerous Americanisms, which we ascribe to the "free editorial control" mentioned in the preface. Perhaps this divided responsibility is also responsible for the rather numerous orthographical errors in the book. Thus we find "opthalmic" "seclusion pupillæ" "opsona," "discovery" for "recovery, "therotherapy," pineal for pituitary, "Crooks" and "Kniess."

The metrical system has been adopted for the prescriptions. It would not entail a large amount of work or expense to have them written in their Imperial equivalents as well, and thus add to the convenience of their use in this country.

The criticisms we have made are of a minor nature, and are possibly, to a certain extent, prompted by "insular prejudice," but they do not in any way detract from the supreme merits of the work. In 1902 the *Leçons de Thérapeutique Oculaire* was "the best work published in practical therapeutics," but we certainly have here something still better.

J. JAMESON EVANS.

Sammlung zwangloser Abhandlungen aus dem Gebiete der Augenheilkunde. **Besteht ein ätiologischer Zusammenhang zwischen parenchymatöser Keratitis and Verletzung?** (**Is there a relation of cause and effect between an injury of the cornea and parenchymatous Keratitis?**) By A. Vossius, of Giessen. Halle a. S.: Carl Marhold, 1910. Price, 1 mark.

Here Dr. Vossius replies to the above question in the affirmative, and adduces various cases in support of this view. One reported by Perlia in 1905 starts the discussion, in which a wire-drawer, who suffered from hereditary syphilis, and was 16 years old, received a spicule of brass in his right eye. A fellow workman removed it, and no trouble was anticipated: but from the seat of injury a diffuse parenchymatous keratitis developed, and in the course of three weeks, the opposite eye became affected. Appropriate treatment was adopted, but the patient was unable to continue at his work and claimed insurance. This case was brought before the meeting of the Rheinish Westphalian ophthalmologists at Düsseldorf; various opinions were expressed at the meeting on the case. Perlia himself attributed the effects observed to vaso-motor influence occasioning reflex hyperæmia and leading to inflammatory trouble of the opposite eye.

Dr. Vossius then proceeds to detail cases of his own. One was in a girl with hereditary syphilis who was struck with a snowball on the closed left eye. In about two months the right eye had become seriously affected, the vision of the left eye remained at 5/20, the right at 5/25. Keratitis in each case progressing rapidly. In another case, a young man of 22 years of age received a blow on the left eye with a fragment of mortar, part of which was removed by a fellow workman. He also had a doubtful parental history. Diffuse parenchymatous keratitis followed. Dr. Vossius records three other cases which occurred at ages of 14, 16, 18. In addition to this, one of 22, all seemed to have been syphilitic. The types of inflammation following the injury were various. Recovery may take place. HENRY POWER.

The Extra Pharmacopœia of Martindale and Westcott. Fourteenth Edition. London: H. K. Lewis, 136 Gower Street, W.C. 1910. Price 12s. net.

This well-known and valuable work of reference again reappears in its familiar form and binding. Every edition seems to be a little larger and more crammed with useful facts than its predecessor. The fourteenth edition fully maintains the deservedly high reputation which the book has won for itself. The ophthalmic surgeon will find much to interest him. The question as to whether cocaine is decomposed by boiling is answered in the negative, and Stephenson's experiments are adduced in favour of this view. We have always sterilized our cocaine *by bringing it to the boil*, and have never found any loss of anæsthetising effect. But we have found that prolonged boiling, from one to three minutes, does seriously reduce the efficiency of the drug. Some recent experiments upon alypin (THE OPHTHALMOSCOPE, Vol. VII, 1909, p. 665) made by Elliot at Madras, showing that it was not a reliable anæsthetic for extraction, receive no notice. The pages devoted to sera have greatly increased in number, and contain a large amount of useful information. We fail, however, to find any reference to Paton's anti-diphtheritic serum, which is specially adapted for oral administration, and has proved most helpful in inflammatory

conditions other than diphtheria. Fibrolysin and thiosinamin receive adequate notice. The whole book is a monument of careful, painstaking, and accurate work. T. HARRISON BUTLER.

On the Nature of the Infection in Trachoma. (Ueber die Natur und die Herkunft des Trachomerregers und die bei seiner Enstehung zu beobachtende Erscheinung der Mutierung des Gonokokkus Neisser.) By Prof. Dr. HANS HERZOG. Berlin: Urban and Schwarzenberg, Freidrichstrasse, 105 B. 1910. Price, 5 Marks.

In this interesting and suggestive monograph Professor Herzog develops the theory that the real infective agent in trachoma is the gonococcus, and that the cell inclusions, the "chlamydozoa," described by v. Prowazek and Halberstädter, are metamorphs of the gonococcus. Herzog calls ordinary gonococci *macro-gonococci*; the cell inclusions he calls *micro-gonococci*. v. Prowazek was Schaudin's collaborator in the investigations which terminated in the discovery of the spirochæta pallida, now universally recognised as the ultimate cause of syphilis. The use of Giemsa's eosin methylene blue stain allowed this micro-organism to be demonstrated, and in consequence v. Prowazek decided to use the same stain to try to find an organism which would bear the same relationship to trachoma that the spirochæta pallida does to syphilis. Working with Halberstädter in Java on cases of fresh trachoma, they discovered certain cell inclusions, which they held to be protozoal in nature, and which were placed among the "chlamydozoa." These observations were confirmed by Clausen, by Greeff, and by many other workers on the Continent. It is an undoubted fact that these cell inclusions are often found in the tissues of the conjunctiva in cases of fresh, untreated trachoma.

But now Stargard and Heymann have discovered the same cell inclusions in cases of typical ophthalmia neonatorum, in which the presence of the gonococcus had been found by smear preparations and cultures. It may be added that similar bodies are found in spring catarrh and in conjunctivitis sicca (Peters.—*Die Erkrankung des Auges im Kindesalter*, 1910, S. 52).

Herzog, far from taking these facts as evidence, has endeavoured to harmonise them, and a close study of his work leads to the conclusion that his theory is a plausible one.

Lindner and v. Prowazek with Halberstädter and others accept the truth of Heymann's work, and to account for it postulate an "acute trachoma of infants" of non-gonococcal origin, apparently forgetting that Heymann's cases are expressly stated to be gonococcal.

How can these facts be harmonized? Herzog showed his sections to the first protozoologist in Munich, who was quite certain that the cell inclusions were not the product of cell degeneration, but were parasites. There is nothing analogous to the trachoma chlamydozoon to be found among the protozoa. Not among the sporozoa nor the neosporidia is there a single form in any way comparable in either form, size, or morphological habit to v. Prowazek's chlamydozoon. Nor can they be compared with those parasites which have been found in amœba vespertilio by Doflein, which belong to the chytridiacea, organisms allied to low fungi. These structures have polar flagellæ and are 3-5 μ long. They cannot have anything in common with such bodies as the trachoma cell inclusions. Herzog submitted them to Professor Schwendener, who has made a special study of the lower fungi. He and Drs. Dauer and Jahn, all workers in the Imperial Botanical Institute at Berlin, declared these inclusions

to be *colonies of bacteria*. This threw an entirely new light upon the question. It was now only necessary to prove the change of gonococci into cell inclusion granules to harmonise the discordant facts stated above.

Herzog had already noticed in smears from gonorrhœal pus stained by Giemsa many more gonococci than he would have expected, and also that they showed a tendency to collect near the nucleus of the leucocytes, and they were agglutinated together by a shroud of plastin. This gave rise to an appearance like the nuclear cap seen in trachoma preparations. This collection in a plastin mass round the nucleus, Herzog believes to be preparatory to the formation of the small metamorphic form. In cultures the gonococcus tends to rapid degeneration, and soon loses its vitality when inoculated from tube to tube. The author now entered upon a study of this peculiarity. He was astonished to find that the kidney-shape was soon lost, and a form appeared which was about half the size of the normal gonococcus, a form which he calls the transitional form of the micro-gonococcus. These stain pale, rose-violet, whereas the normal cocci stain deep, blue-violet. At the same time bent dumb-bell forms appear (*Hantelform*). Masses of mucus (zoogloea) appear. The final form are the micro-gonococci, which measure at most 0·2 μ. These, Herzog says, are identical with the trachoma bodies of Greeff. The coloured illustration show these forms quite clearly.

All these varieties were seen by Herzog in a case of ophthalmo-blennorrhœa in a young girl. When first seen, she had typical gonococci. After some days treatment, these entirely disappeared, but many "trachoma bodies" were now detected. As treatment advanced, these also disappeared.

The following experiment was now made :—an eye which had been blind from absolute glaucoma was inoculated with a pure culture of gonococci from a 12 days old urethral gonorrhœa. Severe blennorrhœa followed. 14 days later typical trachoma bodies were present. The author discusses and tries to meet all possible objections to his theory, which, in effect, is that trachoma is caused by an infection, not with macro-gonococci, but with these small metamorphic forms, the micro-gonococci. He admits that gonococci are never found in acute trachoma except by accident.

The monograph opens up an interesting question, which can only be settled by patient research, but such research should be carried out, not in Europe, but in Palestine or Egypt, where gonococcal ophthalmia sweeps the country like a plague, leaving in its track whole families of blind and semi-blind individuals, and where hardly 10 per cent. of the inhabitants are free from trachoma. It is worthy of note that gonococcal ophthalmia of terrible severity is a pure eye disease in the East, existing quite independently of any venereal infection. This fact was noticed by the reviewer in Palestine, and has recently been confirmed by Meyerhof in Egypt. Here, then, we have in the near East gonococcal ophthalmia very prevalent, trachoma even more so. The association is very intimate. But cases are far from uncommon where severe gonococcal ophthalmia has become chronic and continued for months, and yet no trachoma has resulted. Two things are almost certain—one is that acute trachoma is not caused by the macro-gonococcus, the other that gonococcal ophthalmia, however acute and chronic, does not develop into trachoma. But if Herzog's theory is correct, the micro-gonococcus must be exceedingly common in the near East, and may account for the frightful prevalence of trachoma in those countries.

The matter should be taken up earnestly by our colleagues in the East who possess advantages denied to us at home. T. HARRISON BUTLER.

E. Merck's Annual Report of Recent Advances in Pharmaceutical Chemistry and Therapeutics. 1909. Volume XXIII. Darmstadt, July, 1910. London office: 16, Jewry Street, E.C.

The twenty-third volume of Merck's *Annual Report*, which deals with the advances in pharmaceutical chemistry and therapeutics during the year 1909, has recently been issued. It is replete with information likely to be of service to the eye surgeon, although it is, of course, in no sense a publication dealing only with ophthalmic products.

A good deal of space is taken up with an account of serum therapy and bacterio-therapeutic preparations. The injection of diphtheria antitoxin in pseudo-membranous conjunctivitis, ulcus serpens corneæ, iritis, and suppurating wounds of the eye is mentioned, and the recent happy experiences of Darier, Zimmermann, and Scheuermann with the method are described. It is possible that some of the affections treated by these means were due to the Klebs-Löffler bacillus, but in most of the cases we are dealing with a general serum action. It will be remembered in this connection that normal serum has been employed with success in quite a number of affections. The favourable results obtained by Kraus, Coppez, Hoor, Hummelsheim, Collins, Seefelder, and others with jequiritol receive mention. Rampoldi's employment of the same agent in cancerous and tuberculous new growths is alluded to. Under the name "*Pneumococcus serum Merck*" the Darmstadt firm has introduced a new serum, the effects of which can be tested upon animals It is made by the use of very virulent cultures mostly derived from human pneumonia. The treatment of ulcus serpens corneæ with this new product may be either prophylactic or curative, and in either case 200 U.I. (units of immunity) are injected into the subcutaneous connective tissue of the thigh. If the cornea be already involved, a few drops of the serum are applied locally every hour. "There is no room for doubt," says the *Report*, "that the serum marks a material advance."

An account is given of Hamburger's interesting experiences with fluorescein-sodium. The internal administration of from 1.5 to 6 grammes (grs. 24 to grs. 90) of that substance produces no obvious change in the healthy eye. But if intra-ocular disease be present, the aqueous humour assumes a bright-green colour, an appearance absent even when the conjunctiva is severely inflamed. Here we have, then, a ready means of distinguishing intra- from extra-ocular disease, such as may possibly be useful to the country practitioner in establishing the difference between, say, glaucoma and inflammation of the conjunctiva.

Arsenophenyl-glycin, a new organic compound of arsenic, has been pressed into the service of ophthalmology by W. Gruter, who found a 5 per cent. ointment useful in the treatment of eczematous pannus and fascicular keratitis. Valenti's experiences with picric acid in serpiginous ulcer of the cornea and other forms of keratitis are mentioned, and the caution is given not to use the acid if cicatrisation be already far advanced.

Sophol, one of the newer organic preparations of silver, comes in for attention, and its use as a prophylactic in ophthalmia neonatorum (Feulner, O. v. Herff) is mentioned. Bondi has employed a 10 per cent. solution in the same disease as a curative agent, and has, besides, used it in many different kinds of conjunctivitis. Even pure sophol applied to the eyes exhibits no caustic action, a decided advantage when compared with silver nitrate. On the other hand, the action of sophol is superficial, so that it can be used to the greatest advantage only when micro-organisms merely adhere to the surface of the conjunctiva. Finally, it is important to avoid heat when making solutions of sophol, and the preparation should be kept in the dark.

Speaking of ophthalmia neonatorum, it is suggested by the *Report* that a trial might be made of the silver salts of glycocholic and taurocholic acids, or a combination of the well-known silver salts with bile acids. It is pointed out that the latter have the power of dissolving mucus, and thus of enabling the silver compounds to get access to the gonococci.

In conclusion, it may be added that Merck's *Reports* will be sent free to medical men on application to the London office. It may also be obtained through a bookseller at 1s. 6d. per copy. SYDNEY STEPHENSON.

CORRESPONDENCE.

[While THE OPHTHALMOSCOPE will at all times welcome correspondence from its readers, the Editor does not hold himself responsible for any views expressed in this column.]

The Ehrlich-Hata Preparation.

To the Editor of THE OPHTHALMOSCOPE.

DEAR SIR,

In a letter from my friend Dr. Ehrlich, dated November 1st, occurs the following:— "I have placed my preparation ('606') in the hands of the firm of Messrs. Meister, Lucius, and Bruning, at Hochst a/M. near Frankfort, and they are now preparing it in large quantities. Any medical man can have samples on application to that firm after December 1st of this year."

I am, Sir,

Yours truly,

GEORGE LINDSAY JOHNSON.

BERNE,
November 3rd, 1910.

Lead Style in Nasal Duct.

To the Editor of THE OPHTHALMOSCOPE.

SIR,

I beg to call the attention of the readers of THE OPHTHALMOSCOPE to a somewhat ridiculous error in my memorandum "Lead Style in Nasal Duct for Ten Years" in the November issue. In the second last paragraph the word "minutes" should read "months."

Yours, etc.,

ERNEST THOMSON.

2, SOMERSET PLACE,
GLASGOW.
November 10th, 1910.

NOTES AND ECHOES.

Ourselves.

Mr. C. Devereux Marshall, who has acted as sub editor of The Ophthalmoscope since its foundation in 1903, has been compelled to resign his position owing to increased professional responsibility and work. His resignation will be regretted by every reader of the journal.

Mr. Marshall has been succeeded by Dr. Ernest Thomson, of Glasgow, who has been editorial secretary of The Ophthalmoscope for several years.

Dr. T. Harrison Butler, of Coventry and Leamington, has accepted the editorial secretaryship vacated by Dr. Thomson.

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Deaths.

The death of Dr. Krönlein, of Zürich, is announced, at the age of 64 years, from angina pectoris. For a lengthened period Krönlein occupied the chair of clinical surgery at the University of Zürich, and during that time devised his famous operation of osteo-plastic resection of the orbit.

With regret we announce the death of Dr. A. Trousseau, of Paris, which took place on November 1st, as the result of a fractured skull sustained in a motor-car accident. This famous operator was attached to the *Quinze-Vingts*, as well as to the *Fondation Rothschild*. His reputation was international.

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Appointments.

Mr. Hugh Boyd Cunningham has been appointed surgeon to the Sunderland and Durham County Eye Infirmary *vice* Dr. C. A. S. Dagleish, whose death was announced in last month's Ophthalmoscope.

Mr. Beatson Hird has been appointed ophthalmic surgeon to the Birmingham Lying-in Charity Maternity Hospital.

Dr. Georg Lentz has been recognized as *privat-dozent* in Breslau, Dr. L. Guglianetti in Naples, Dr. Zade in Heidelberg, Dr. J. Igersheimer in Halle, and Dr. R. Salus in Prague (German University).

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Royal College of Surgeons and Blindness.

The Council of the Royal College of Surgeons of England has advised the Registrar-General that blindness for census purposes should be subdivided into "blind" and "partially blind"; the former term including persons stone-blind or so blind as to be unable to count fingers in daylight at more than three feet distance, and the latter persons who cannot be educated or earn their living by means of their sight. It also suggested that if only a single heading could be used, the meaning of the word "blind" should be defined.

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Australasian Medical Congress.

A HIGH honour has been paid to our colleague Mr. F. Antill Pockley, who will preside over the Australasian Medical Congress to be held in Sydney during September of next year.

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Nottingham and Midland Eye Infirmary.

THE erection of new buildings for the Nottingham and Midland Eye Infirmary having been decided upon, an anonymous gift of £1,000 from a friend is announced.

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The notification of Ophthalmia neonatorum.

THE London County Council have decided to order under Section 56 of the Public Health (London) Act 1891, that compulsory notification of infectious disease should apply in the administrative county to ophthalmia neonatorum. The Midwives Act Committee asked that the Council should take action with a view to the more effectual prevention of blindness or impairment of vision caused by the want of prompt and efficient medical treatment among newly-born infants. The compulsory notification of ophthalmia neonatorum might prove advantageous. So far as the practice of certified midwives was concerned, there was already in existence a method of notification, as one of the rules of the Central Midwives Board, made under the provisions of Section 3 of the Midwives Act, 1902, and confirmed by the Privy Council, required every certified midwife to advise that medical assistance should be obtained in every case of inflammation of the eyes, however slight. This advice must be given in writing in a prescribed form, and a copy must be sent to the local authority within twenty-four hours. The information obtained under a compulsory notification order would enable the medical officers of health of the various sanitary districts (the metropolitan boroughs) to make known to those concerned the opportunities available for treatment in necessitous cases. It would be found of value in cases in which the infant was taken to a medical practitioner, perhaps at a hospital, who did not have the opportunity of keeping it under treatment, and incidentally it would serve a useful purpose in bringing to light cases attended by midwives concerning which they had omitted to advise that medical aid was necessary. Notification would render more complete the arrangements for securing continuous and efficient treatment of the child. The Order will be advertised, and a copy sent (as directed by the Public Health Act) to every qualified practitioner residing or practising in the County of London.

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The Richard Middlemore Lecture.

THE annual Richard Middlemore Post-graduate Lecture will be delivered by Mr. Sydney Stephenson at the Birmingham and Midland Eye Hospital on Thursday, December 1st, at 4 p.m., the subject selected being "The Aftermath of Eye-Strain." Members of the profession are invited to attend. —*British Medical Journal*, November 5th, 1910.

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Two sides to the Question.

THE VALUE OF THE DIPLOMA OF THE WORSHIPFUL COMPANY OF SPECTACLE MAKERS.

SIR,—A prescription of mine for glasses was taken by the patient to a sight-testing "optician and spectacle specialist," who advertises himself as holding the diploma of "The Worshipful Company of Spectacle Makers, London."

I had ordered, acccording to my custom, that the glasses were to be sent to me for verification, and in course of time they were sent to me by the optician. On examining the glasses, I found that the lenses were wrong; spheres had been given in place of cylinders and cylinders in place of spheres. The centreing of the lenses was grossly wrong, 10 mm. beyond what I had ordered, so that the centreing in one lens was only just on the lens. The shape of the lenses was not what I had ordered, although I had sketched the shape I wanted. The workmanship of the frames was poor, the frames so soft that they bent easily, and the cutting of the lenses was very rough.

Yet, with all these errors, the optician would appear to be so ignorant of his work that he sends the glasses to me for verification, believing them to be right.

Surely it would be better if the Worshipful Company of Spectacle Makers took some care that those holding their diploma could carry out their proper work, namely, to make spectacles correctly, than that they should endeavour to extend their sphere to sight-testing.—I am, etc.,

RAYNER D. BATTEN.

London, W., Oct. 24th.

British Medical Journal, Nov. 5th, 1910.

COMPETENCY IN SIGHT-TESTING.

SIR,—The following case is an example of spectacle prescribing and fitting, by a general medical practitioner.

A lady, who states she has never had good sight, suffering with bad headaches, consulted her doctor. He gave her the following lenses: O.D. + 1.5 D.S. O.S. + 1.0 D.S. V.A. without lenses. O.D. 4.5/36 O.S. 4.5/24.

The plus lenses worn made distant vision worse, though they relieved the headache to some extent. They had been worn constantly for five years. The following lenses gave V.A. as follows:—

O.D. + 2.5 D.C. 105° = 4.5/12.
O.S. + 3.5 D.C. 130° = 4.5/6.
Bin. V.A. = 4.5/6 easy

F.S.M.C.

Optician and Photographic Trade Journal, November 4th, 1910.

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Opticians and Spectacles.

A FEW months ago a deputation from the Worshipful Company of Spectacle Makers, introduced by the Hon. Harry Lawson, M.P., approached the chairman of the Education Committee of the London County Council (Mr. Cyril Jackson) to

complain of the wording of a paragraph in the "Health Hints" about to be distributed by the Council. The paragraph objected to read as follows :

> "Sore eyes are often due to bad health or over-strain. Cleanliness always, and golden ointment often does good. Spectacles may be wanted, but should be worn only when they have been prescribed by a doctor. They should never be obtained from an optician or 'eyesight specialist' unless they have been prescribed by a doctor. Coloured spectacles are not allowed in school."

At the time considerable commercial capital was made of the matter, which, it was believed by some sections of the trade, would influence public opinion. An article endorsing the claims of the opticians was indeed published in the *Daily Telegraph* of August 11th last. Meanwhile, the British Medical Association was not inactive. Steps were taken to put the medical aspect of the position before the Education Committee of the Council, and the result is to be seen in the following paragraph, which has been substituted for the one to which exception was taken by the opticians. It is for them to say whether the change is for the better :

> "The children may require spectacles, but these should be worn only when prescribed by a doctor. The children's eyes should never be tested by opticians or eyesight specialists, as these do not use the necessary drugs."

This paragraph, it is stated, was agreed to at a conference at which Lord Hill, Mr. Sebag Montefiore, Colonel T. Davies Sewell, and Mr. Lionel Laurance were present.

* * * *

First Sight at Forty.

A remarkable story of the impressions of a man who obtained his first glimpse of the world at the age of forty, is told by Dr. Edward Ayers in the August number of *Harper's Magazine*.

The man, whose identity is hidden under the pseudonym of "Farmer John," had all the machinery of vision except for a pair of cataractous lenses, which curtailed the world from his healthy retinas like ground-glass pebbles. These were removed by Dr. James L. Minor, who gives the following account of the man's actions immediately after the operation :—

"Some of my confrères at the hospital and the sister superior were invited in to see him, and to allow him to get impressions of other people through his new sense of sight.

"He looked at each intently and with great interest, but made few comments further than to ask if all women were like the sister. (He told me later that he wished to get some idea of how women looked, and that if his wife looked like the sister he would leave her.)

"Asked if he would like to see himself, 'I sure would,' was his eager reply. 'I am not as pretty as I thought I was,' he said, and there was visible disappointment in his face.

"He was shown, but not allowed to touch, an apple; and when pressed to say what he thought it was, said, 'It might be an apple, because it's round like an apple and its striped red and green like an apple.' This was the first time colours were seen, and they were correctly recognised and named.

"Seeing a pug dog, he said: 'It's a mighty strange-looking dog, with its tail curled up in a bow-knot over its back. All the dogs I ever knew kept their tails between their legs'—a habit of the hound when petted.

"Sitting in the park he beheld a peacock, which began strutting towards him. 'I was scared,' he afterwards told me. 'The thing looked like it was making for me, and I got up and cut for new quarters, and only came back after John (his guide) finished his laugh and told me what the thing was.'

"As to his perception of colours, he had no explanation to offer nor have I. It is simply a fact that pronounced colours were correctly recognised the first time they were seen, without previous visual knowledge or cultivation by an eye forty years old."

* * *

Insurance for Opticians.

In view of the recent case Markham *v.* Wood-Abrahams (fully reported in another column), it is not surprising to find that an insurance society is offering a policy providing funds up to £1,000 for the defence of any legal proceedings brought against an optician on the ground of malpraxis, the premium being £2 10s. annually, with an additional 5s. for each assistant employed.

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The Ophthalmological Society.

At a meeting of the Ophthalmological Society of the United Kingdom held on November 10th last Dr. Thomas Buzzard, of London, was elected an honorary member of the Society.

At the same meeting the following foreign members were elected:—Professors Wagenmann (Heidelberg), O. Haab (Zurich), Allvar Gullstrand (Upsala), Dimmer (Vienna), E. von Grosz (Budapest), Angelucci (Naples), H. Snellen (Utrecht), Theodore Axenfeld (Freiburg), Carl Hess (Wurzburg), W. Uhthoff (Breslau), and Straub (Amsterdam), together with Drs. Sulzer (Paris), Arnold Knapp (New York), and Eric Nordenson (Stockholm).

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Cheshire County Council: Education Department.

The following extract from the report of the Chief School Medical Officer of the Cheshire County Council for the year 1909, is not devoid of interest to hospital surgeons:

> Though I say it with the greatest reluctance, I cannot help remarking that the examination of the eyes of School children in some of the Eye Hospitals to which such children are usually taken is not so exact or complete as it might be. There probably is some excuse for this. In one instance which came under my personal observation almost accidently this was certainly the case. A child who had been notified as suffering from defective vision by the Medical Inspector was duly taken to a well-known Eye Hospital, examined, had glasses prescribed and had them made by the Optician who was recommended. The Teacher presented him for re-examination on a subsequent visit of the Medical Inspector, when I happened to be present. The usual tests were gone through, and it was readily apparent that the child was helpless in the matter of recognising the test-type. I asked him to form the letters with his finger, and was at once struck with the fact that he made the proper number of strokes, but they were all in the wrong

directions. I then gave him a pencil and paper and asked him to draw the letters. He drew the large capital E thus ⊐. On being asked to draw a cat he drew it standing on its tail instead of its legs, and similarly he drew a ship standing on its bowsprit instead of its keel. He was referred back to the Eye Hospital with some notes of this peculiarity. The difficulty of educating a child with this kind of anomalous sight—seeing things half-upside-down—will be more apparent than in the cases already mentioned and illustrated where the effect produced by the anomaly is merely a blurred and indistinct image.

* * * *

The Optician in the Schools.

Dr. Meredith Young, the Medical Officer of Health of the Cheshire County Council, has also something to say upon the question of the optician in the schools. Here are his words :—

An optician in a town in one of the neighbouring counties wrote to me during the year volunteering to place his services at the disposal of the county for the examination of the eyes of children certified to have defective vision, and to provide suitable glasses on certain terms. Correspondence, however, elicited the fact that apart from his not being properly qualified to make a scientific medical examination of the eye, his terms were altogether too prohibitive, and the matter was therefore taken no further. I give some of his prices, and for comparative purposes those of a contract in force in a well-known city in the North of England between the Education Committee and an optician there :—

	Optician	City Contract
	s. d.	s. d.
Spherical lenses	5 6	1 3
Cylinders	7 0	1 10
Sphero-cylinders	8 6	2 5

To the city contract prices, however, there would have to be added the cost of medical examination and prescription. If arrangements could be made for medical examination and prescription at the cost of the Education Committee or in any other way, the mere cost of glasses to the parents would not be at all a serious item if a contract at all approaching the one quoted above could be obtained. Such an arrangement would certainly prevent what it is feared is a very usual occurrence, viz., that when parents take a prescription for glasses to an optician they are charged an excessive price for them. Several cases have come to my knowledge where a charge of 14s. or 16s. per pair has been asked from parents, and they have been utterly unable to obtain the glasses in consequence.

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Addendum.

By an unfortunate oversight, the name of Mr. F. A. Newman was omitted from the list of candidates who were successful at the recent examination for the Diploma in Ophthalmology of the University of Oxford. We hasten to supply the omission.

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